MIDDLE EAST@WAR No.32

75 YEARS OF THE ISRAELI AIR FORCE

VOLUME 2: THE LAST HALF CENTURY, 1973–2023

Bill Norton

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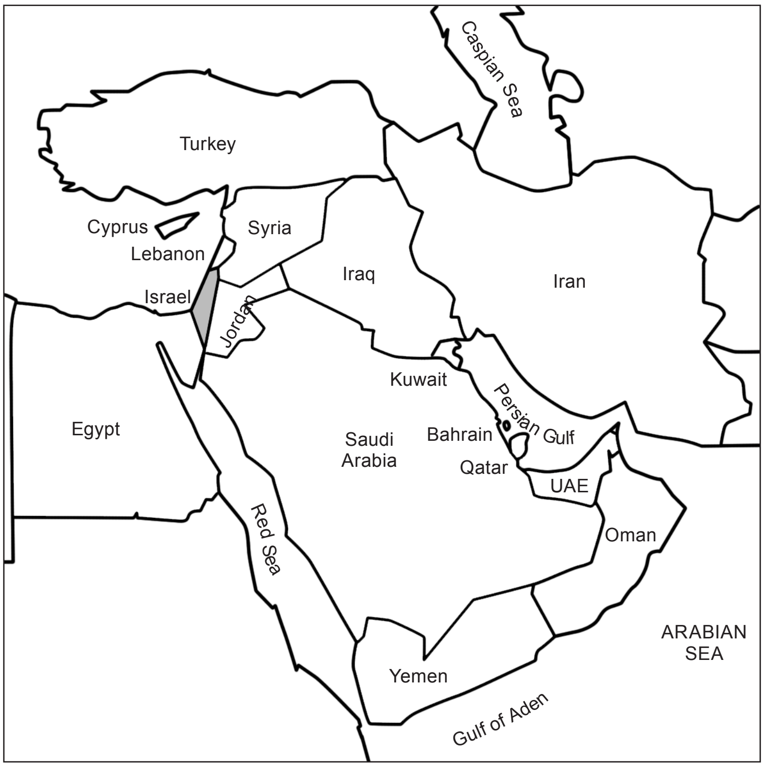

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Cover Artwork

Kfir C.2 serial number 909, from 149 Squadron, as seen around 1987, in camouflage pattern consisting of two shades of grey, with coloured chevrons on the fin. As a follow-on to the Nesher, Israel built the similar Kfir with an American engine, the most numerous variant of which was the C2. It is equipped with external tanks that still wear the earlier camouflage finish, and Python III missiles. By the time the Kfr began to fill squadrons, the F-15s and F-16s rendered it second-string and consequently, it focused on ground attack. With 212 airplanes delivered from 1975 through 1986, the type filled six squadrons at its peak. The last C2 operator, 149 sent is mounts to the "boneyard" in 1995. (Artwork by Tom Cooper)

The main photograph shows F-15D, serial number 957 "Skyblazer" of 106 Squadron, displays that unit's common tail insignia and blaze markings inside the vertical tails. Also seen is the stenciled Improved Baz (Falcon) marking on the outboard surface of the tail indicating the aircraft upgrade and appearing from 2000. The aircraft carries 4½ Syrian kill roundels; four earned in June 1982 and the shared victory in November 1985 as the last manned combat aircraft known downed by the IAF. This aircraft had also survived a mid-air collision with an A-4 in 1983. (Ofer Zdion)

Acronyms and Abbreviations

AA	anti-aircraft
AAA	anti-aircraft artillery
AAM	Air-to-Air Missile
AB	Air Base
ABM	anti-ballistic missile
AEW	Airborne Early Warning
AHQ	Air Force Headquarters
AMU	Aircraft Maintenance Unit
APC	armored personnel carrier
AR	aerial refueling
ARM	Anti-Radiation Missile
BVR	beyond-visual-range
C^2	Command and Control
C^3	Command, Control, and Communications
CAP	Combat Air Patrol
CAS	Close Air Support
casevac	casualty evacuation
CFT	Conformal Fuel Tank
CGS	Chief-of-General-Staff
CO	commanding officer
COMINT	Communications Intelligence
CSAR	combat search and rescue
ECM	Electronic Countermeasures
ELINT	Electronic Intelligence
EO	electro-optical
EW	electronic warfare
FLIR	Forward-Looking Infrared
GHQ	General Headquarters
GNP	Gross National Product
GPS	Global Positioning System
HMD	Helmet-Mounted Display
HUD	Head-Up Display
IAF	Israeli Air Force, Israel Air Force
IAI	Israel Aircraft Industries, Israel Aerospace Industries
IASF	Israel Air and Space Force
IDF	Israel Defense Forces
INS	Israel Navy Ship
IR	infrared
ISR	intelligence, surveillance, and reconnaissance
JDAM	Joint Direct Attack Munition
kg	kilogram, kilograms
km	kilometer, kilometers
l	liter, liters
LANTIRN	Low Altitude Navigation and Targeting Infrared for Night
lb	pound, pounds
LGB	Laser-Guided Bomb
m	meter, meters
MNF	Multinational Force
MoD	Ministry of Defense
Mt.	Mountain
NATO	North Atlantic Treaty Organization
NOE	nape-of-the-earth
NVG	Night Vision Goggles
OCC	Operational Conversion Course
ORBAT	order-of-battle
OTH	over-the-horizon
OTU	Operational Training Unit
PA	Palestinian National Authority
PGM	Precision Guided Munition
PLO	Palestine Liberation Organization
PM	Prime Minister
QRA	Quick Reaction Alert
q.v.	*quod vide* (on this, go see)
recce	reconnaissance
ROE	rules of engagement
RPG	rocket-propelled grenade
RPV	Remotely Piloted Vehicle
RWR	Radar Warning Receiver
SAM	Surface-to-Air Missile
SATCOM	satellite communications
SDB	Small Diameter Bomb
SEAD	Suppression of Enemy Air Defense
SIGINT	Signals Intelligence
SLA	South Lebanon Army
SyAAF	Syrian Arab Air Force
TEL	transporter erector-launchers
TV	television
u/s	unserviceable
UAV	Unmanned Air Vehicle
UN	United Nations
US, USA	United States of America
USSR	Union of Soviet Socialist Republics
VHF	Very High Frequency
VIP	Very Important Person

Preface

May 2023 marks the 75th anniversary of the founding of the State of Israel and its air force. The maturation of the Israeli Air Force (IAF, Israel Air and Space Force or IASF from 2005) during its 75 years is a fascinating study of a relatively small military force working to meet shifting obligations under multiple impediments while being repeatedly tested in combat. Many factors over the decades shaped the air fighting capability, not the least being the demands of the evolving battlefield, uncertain funding, available weapons, and quality of personnel. Tactics and doctrine were, in turn, shaped by government policies, international pressures, and confronting adversaries likewise evolving. When the trials in war or combat short of war came, success was a measure in relevance of the service's weapons, adequacy of training, and experience of personnel.

The three volumes in this series document this evolution of the Air Force throughout its history by examination of all of these factors. It stands apart from many other books in performing this examination in a more dispassionate and critical manner, without the common hyperbole. A good deal of space is devoted to describing the shifts in the force's aircraft and other weapons over time. An air force is structured to match its capabilities as defined by its aircraft and associated tactics, and so that structure is examined as well. Accounts of the service's combat operations then show the effectiveness of all the equipment and preparation. A summary of the geopolitical milieu in which Israel and its military institutions dwelled over the 75 years helps to understand the materiel acquisition and tactical choices while placing in context the operations in which they were employed. These volumes are written at a time of historical changes for the air force, and the Israel Defense Forces (IDF) as a whole, and so informs understanding of the service emerging and operating in future years.

These books leverage off of my volume *Air War on the Edge, A History of the Israel Air Force and its Aircraft since 1947* (Midland Publishing, 2004), but with a different focus and, of course, updated. Backed by official and unofficial histories published since, and the unprecedented openness in the past few decades (yet filtered through the military censor), I have worked to make this account more accurate and complete than those of the past, albeit restricted by limited size of the volumes. It is additionally constrained by the inability to conduct conventional research, confirming information via multiple official sources, because of security restrictions and foreign national access limitations. Consequently, errors may have crept in and disinformation unwittingly repeated. Place names and the names of persons are those most commonly referenced, as are Hebrew translations (for example, "Israel Air Force" and "Israeli Air Force" are both found alternatively throughout officially translated literature and signage). Written for the distant future reader, past tense is employed throughout these books.

I thank all those who assisted with research material, additional information and confirmation of facts, and providing photographs. I am also grateful to all those Israeli authors who labored so hard and for so long to record the history of the IAF/IASF in open literature via original research from which this interloper could mine in the writing of this book. A special thanks to my friend Ra'anan Weiss who was the inspiration for these books and their format.

Those readers who would care to comment on these and my other publications, or offer additional research material and photographs, may contact me at williamnorton@earthlink.net.

Bill Norton
Tehachapi, California, 2021

Introduction

Volume 1 of this three-volume series introduced the first quarter century history of the Israeli Air Force. This was a momentous period, with air power playing a role through four wars and other military actions while the IAF grew materially and experientially.

The IAF started from a collection of light-planes in the pre-state period, supporting paramilitary operations of the Jewish Palestine community. This embryo grew to a modest force after the State of Israel was declared and a war ensued with surrounding Arab nations. Experienced foreign volunteers were recruited, and all worked to apply innovation and daring in meeting combat demands. When fighters and bombers were acquired, the tide turned in the air for Israel. The 1948-1949 combat won the state established borders, but no peace.

The Arab nations resented the existence of Israel and sustained the confrontation either directly or via Palestinian Arab irregulars operating from their territories. Israel responded with strong actions seeking to discourage the adversaries, to include covert measures, which perpetuated the animosity. This would be the nature of the conflict for decades. The IAF was initially poorly funded and equipped, and contributed little. When the Soviets began supplying arms to the Arab states, an arms race ensured. Israel found a partner in France, and more capable equipment began to fill IAF bases.

A war came in 1956 when Britain and France allied to seize the Suez Canal that Egypt had nationalized. Israel became part of the operation in the interest of seeing the Egyptian threat blunted. The IDF operations were successful and it, most especially the Air Force, came away with many lessons. The French continued to equip the IAF, but the Arab states always obtained more via the USSR. The service trained for a preemptive strike to cripple the opposing air arms and then suitably support a ground offensive.

The opportunity to implement the preemptive strike came in 1967 when Egypt threatened war in alliance with other states. The June 5 strikes were tremendously successful, gaining the IAF air superiority. The IDF then overran the Sinai Peninsula, the West Bank of the Jordan River, and the Golan Heights. The Six-Day War was such a resounding military success for Israel that the IDF gained worldwide recognition. The flood of more Palestinian

Arab refugees, the occupied territories, and continued strong defensive military actions, gained Israel additional international rapprochement. With the Suez Canal closed and international terrorism rising, the Arab-Israeli conflict became of concern to the entire world.

Egypt, in particular, continued to press Israel with a War of Attrition on the Suez front. However, contests with Syria and Palestinian irregulars kept all fronts hot. The United States became the principal arms supplier of Israel. Adopting these weapons in ever greater quantities, confronting a growing anti-aircraft array, and expanding the air war made this an especially tumultuous period for the IAF. When the struggle came to a pause in summer 1970, the ability of the Air Force to operate in the face of the surface-to-air missiles remained in question.

Egypt and Syria continued to consolidate their air defenses and remained on a war footing until launching a surprise attack in October 1973. The Yom Kippur War was the longest and most costly contest for Israel, and IDF preparedness was found wanting. The IAF was greatly hampered by air defenses and could not provide the support ground forces had come to expect. There was much post-war work to do in answering these deficiencies and prepare for continuing conflict.

CHAPTER 1

RAPID EVOLUTION

The sobering losses of October 1973, with inadequate planning and tactics, was cause for serious reflection within the Israeli Air Force (IAF). Some refocus was clearly necessary, along with replacement of weapons and personnel retraining. However, the new battlefield realities meant materiel changes as well. Defense expenditures went up yet again and costly IAF armaments continued to consume the lion's share of the budget. A closer relationship to the United States, with greater financial assistance, was instrumental in achieving these goals, but also gave the superpower more leverage over Israeli military options in a crisis.

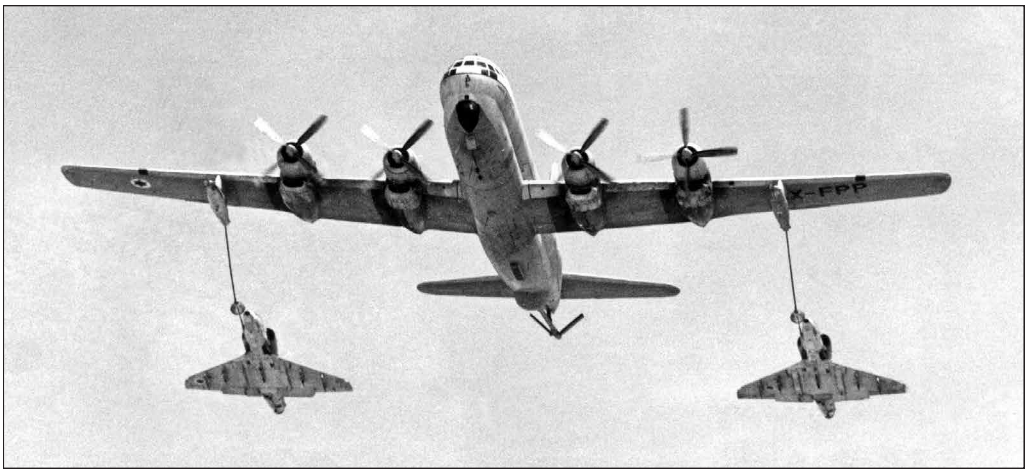
Appraisal

Tensions remained high into 1974 with sizable military forces still deployed. Those months were also spent repairing aircraft and hastening to adopt the new assets provided by the Americans or devised locally to answer enemy capabilities should large-scale hostilities resume. Numerous brief clashes occurred, especially with Syria who made another costly bid in April to recapture Hermon. Disengagement of forces agreements were concluded between Israel and Egypt in January, when the Israel Defense Forces (IDF) began withdrawing from the west bank of the Suez Canal, and with Syria in May when the IDF began returning to the 1967 ceasefire line. The multi-stage, multi-year, pullback was not entirely smooth and the United States of America (USA) threatened to withhold arms deliveries to induce Israel's compliance with the agreements.

The October surprise attack, with resulting high manpower and materiel costs, was a severe shock to Israel. After the resounding success of Zahal (acronym-derived name) in 1967, the mixed result of the 1973 fighting was deeply troubling. Battlefield success did not produce a decisive victory and was at odds with a sense of political and psychological defeat. The nation understood its revered armed forces had been caught ill prepared, had suffered grave reversals, and the war ended on an uncertain note. The failure to anticipate the Arab offensive and the IDF's marginal preparedness was termed "The Blunder." The IDF's – and especially the IAF's – aura of invincibility lost some luster. Added to this were the shocking terrorist attacks that continued against Israel and Jews around the world. The economy sagged under the weight of a defense budget that continued to grow precipitously as more weapons were procured and the army expanded.

Israel would measure all military efforts in the future against the shortcomings in the Yom Kippur War. An undisputed qualitative advantage in equipment as well as personnel was considered essential in regaining the ability to launch a decisive preemptive strike that remained a cornerstone of defense strategy. It immediately set out to grow in strength and size, and improve preparedness for any future war. A clear superiority would also serve as a deterrence, backed by an undeclared nuclear capability (*q.v.*), which would become more important in coming decades than preemption. The term of mandatory military service was extended and the standing army grown by 131 percent during the next nine years in the country of just three million persons. Armor and mechanized forces were tripled in size and the Air Force expanded by 35 percent in number of aircraft. Efforts were undertaken to enforce discipline and adherence to military standards, and even orders, in the traditionally relaxed Zahal. The need for great quantities of equipment was also appreciated after the staggering attrition witnessed during the war, plus ensuring it was not dependent on a foreign power for immediate replenishment. While a formal mutual defense pact was never negotiated between the USA and Israel, other formal security cooperation efforts were organized.

During and immediately after the war, the government committed to the purchase of $2 billion worth of American arms. It was soon spending more on defense than any other nation – 32.5 percent of the budget in 1975 – and with about a quarter of its working population engaged in defense-related enterprises. To help with the massive rearmament program, USA military assistance funding to Israel jumped from $300 million in 1973 to $2.5 billion in 1974 and $3.2 billion in 1975. The USA eventually establish a huge store of munitions and spares in Israel as pre-positioned reserves for USA forces to draw upon in a crisis, but with the understanding that Israel would be given access in the event of large-scale hostilities. Later, the USA earmarked



The tanker capabilities grew to match the fleet that came to include A-4s with probes and F-4s with aerial refueling receptacles. The KC-97 flying booms were acquired and a unit installed on one converted Boeing that retained the wingtip hose-and-drogue pods. This KC-97G 4X-FPP 30 “Meron” was the IAF’s first such “three-point” tanker operated from 1970 to 1975, 4X-FPO getting the equipment after FPP was retired and operating to 1978. (BIAF – Israel Aerospace Magazine)

$300 million of American war reserves for emergency IDF use, although it would have to be delivered from the United States. Some $180 million in American petroleum reserves were also set aside for Israeli use in case the worse happened.

Israeli spirits were raised by the July 1976 raid in Entebbe, Uganda, to rescue Israeli and Jewish hijack victims being held by terrorists. The lightning strike, the soldiers flown in aboard IAF Hercules transports, captured the imagination of the world and brought confidence in the IDF back home. On the diplomatic front, the 1973 war had provided Egyptian President Sadat at least the psychological victory he needed to begin negotiating peace with Israel. The 1978 Camp David Accords and 1979 Egyptian-Israeli peace treaty ostensibly eliminated Egypt as the major threat to Israeli security.

The example of trading land for peace, as Israel slowly evacuated the Sinai, became the tenet of subsequent Arab-Israeli negotiations. Many of the steps were rewarded by the Americans, who had a significant stake in reducing Middle East hostilities, by further bolstering Israel’s security with additional arms. The loss of the training airspace and the strategic depth represented by the Sinai were but two aspects of the sacrifices. The IAF had occupied 11 operational bases in Sinai while building the exceptionally large and modern Etzion and Eitam (this last opening in 1976 while scheduled to be evacuated under treaty terms). Abandonment of these facilities would have left Israel with too few airfields for the large air force it had assembled. The United States provided $2.2 billion in 1979 to cover the expenses of the withdrawal and also constructed two new air bases in the Negev during the early 1980s for $1.2 billion. These airfields had extensive redundant infrastructure and multiple 10,000-foot (3,048-m) runways. Egypt agreed not to base military aircraft in the Sinai, thus giving Israel the same warning time of air attack it had previously enjoyed. The evacuation of the Sinai was completed in 1982.

About the same time Ramon and Ovda were being constructed in the Negev, and became active in October 1981, the Israeli government built Nevatim in that region. Opening in October 1983, this was the largest base in the country with three runways plus taxiways also serving as runways. The three airfields together were designed to house five squadrons, or about 150 aircraft, in hardened underground shelters with full facilities to arm, fuel, and launch the aircraft. Palmachim was also developed into a full air base during the late 1970s, with Unmanned Air Vehicles (UAV) and helicopters as its primary operators. Despite the new facilities, loss of the Sinai airspace created considerable military training traffic congestion over Israel.

New/Old Assets

The IAF moved to replace lost equipment while undertaking a major modernization effort. Maintenance and supply infrastructure were also improved. In the coming years, the USA would permit Israel to buy the very latest American weapons and funded some

The crew of the first C-130 into Entebbe posed for a picture after returning to Israel on July 7, 1976. Squatting in the middle is Lieutenant-Colonel ‘Shiki’ Shani, commander of 131 Squadron. Even disregarding the days of effort with little sleep to pull off the operation, the attire and grooming is typical of IAF aircrew of the period. (Ofer Zidon Collection)

The Skyhawk began being used for advanced flight instruction and lead-in fighter training in 1972, just three years after the type was introduced into the inventory. Both dual-seat and single-seat machines were employed while retaining combat capability, though their missions became second-tier support roles after a time. These freshly painted TA-4Ns show the late-era 102 Squadron markings and the "Improved Ahit" stenciling on the fuselage indicating upgrades. Note also the "barrel" exhaust extension. (Israeli Air Force)

developments or production in Israel. The USA helped with loans and grants, but there was never enough money for all that the Air Force felt it needed. It continued to be an exceptionally frugal service, modifying and retain old equipment and repairing damaged aircraft that would normally have been struck off.

Aside from the 46 A-4Es and Fs delivered by the USA, 15 new TA-4Js were taken up in 1974 and the last order of Ns arrived through 1976. The Skyhawk upgrade program proceeded, with most features extended to all the newcomers. The one flare/chaff dispenser on the E was duplicated and a dual installation added to all the jets along with Radar Warning Receivers (RWR). A locally manufactured self-protection system was integrated in later years. Skyhawk precision attack continued to employ Mavericks and Shrikes.

During the war, it was noticed that the Sa'ar, with its long "tailpipe," suffered less severe damage from the SA-7 warhead than the A-4s. An experiment was performed to extend the exhaust duct of an A-4 to move the exit far enough aft such that the Strela detonation did less significant damage. A workable design was hit upon just after the war and IAF shops began fabricating and installing the "barrels" on all Skyhawks.

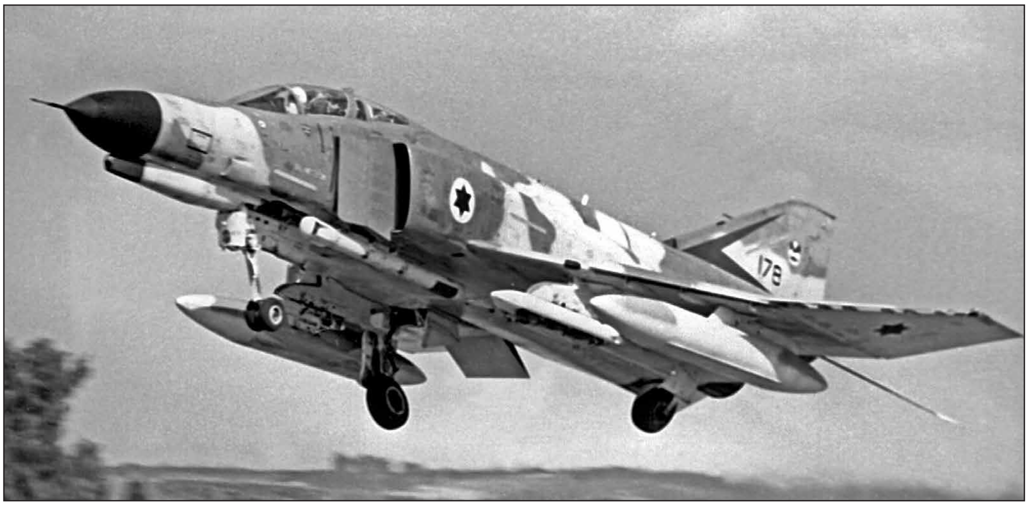
Even with upgrades, the Skyhawk was only considered fit for low-threat environments by the end of the 1970s. At its peak in the mid-1970s, the IAF operated some 250 Skyhawks at four bases in seven squadrons plus the Flying School. It was the last subsonic fighter-bomber in the inventory. As more advanced jets came into the force later that decade and next, dozens of the less useful A-4 models were stored.

The Phantom force was expanded with 24 used and 24 new F-4Es, plus six more RF-4Es. This permitted the Sa'ars to be retired. All the Phantoms eventually got the aerial refueling (AR) probe developed before the war.

After a few more years the Phantom teams concentrated on precision strike with Precision Guided Munitions (PGM). Added to the F-4E's formidable payload was the large Standard Anti-Radiation Missile (ARM), augmenting the Shrikes. The television-guided Mavericks and HOBOS were joined by the GBU-15 glide bomb that also had an imaging-IR seeker for night and limited inclement weather operations. Fielded as well was a locally produced variant of the Walleye; the Rafael Tadmit electro-optical (EO) glide bomb. Two pairs of flare/chaff dispensers also became standard on Israeli F-4s. If the mission required, these could be augmented with a long container mounted in a Sparrow cavity with multiple flare/chaff dispensers.[1] Jamming pods were updated for new threats and advanced models procured.

The Chukars acquired as emergency resupply during the Yom Kippur War were Remotely Piloted Vehicles (RPV), but proved difficult to fly manually. Further examples were purchased after the war and a guidance package built locally. An air-launched decoy, with radar reflector, was derived in the late 1970s from an American system and built by Israel Military Industries (IMI) as the Samson. This was a 400-lb (181-kg) store with deployed wings and fins, carried as three to six on multiple-ejector racks or in the F-4 Sparrow depressions.[2] Range depended on release altitude and it could follow a pre-programmed descent path, plus dispense chaff.

Delivery of ARM risked the launch aircraft facing the Surface-to-Air Missiles (SAM) as their radar began emitting. An alternative was created by boosting these missiles aloft from the ground with



This 119 Squadron F-4E carries a Pave Spike pod in the port forward Sparrow cavity and a practice bomb carrier under the port inboard wing station. Note also the flare/chaff dispenser at the aft end of the inboard pylons. The pod was a targeting unit for the Paveway family of laser-guided bombs that were purchased. The Phantom fleet began adopting such gear as this, plus night vision goggles, in the wake of the Yom Kippur War. (Ra'anan Weiss Collection)

rockets. This also freed up jets for other missions. The Shrike was mated to an Israeli booster rocket and launched from a rail on a tank chassis against radar threats decoyed by drones. Called Trident, the missile was fired on a bearing provided by an aircraft fitted with the appropriate radar detection gear. The IAF deployed at least two batteries of five launchers each. A Standard missile latter replaced the Shrike on the tank to be called Cricket, and this was eventually moved to a five-ton truck. Surface-to-surface rockets continued to be an option for degrading enemy air defenses with the Israelis purchasing American mobile Lance missiles.

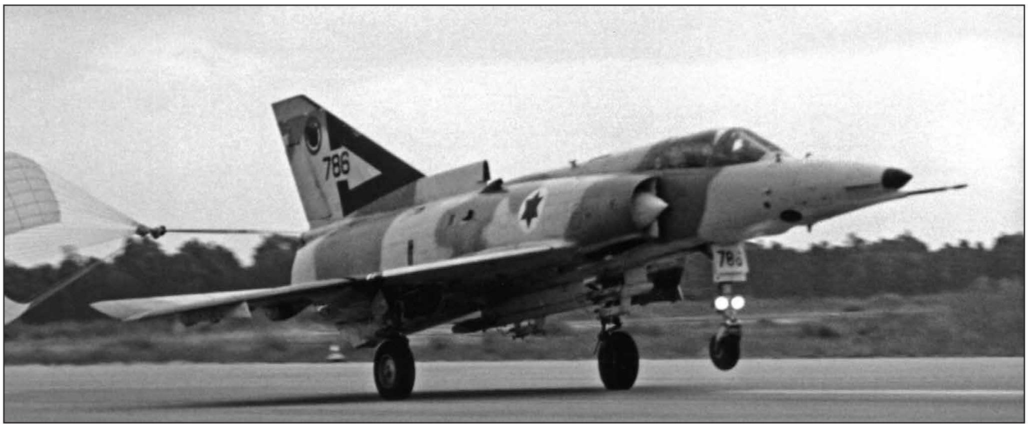
New dimensions were also added to the Phantom teams. Night fighting capabilities were increased with Night Vision Goggles (NVG) and laser-guided bombs introduced.[3] The F-4 began carrying the Pave Spike laser designator pod matched to the GBU-10 and GBU-12 Paveway bombs.[4] These could also be dropped on a target illuminated by a ground team. Such resources were limited and not adopted fleet-wide.

The upgrading of Mirage IIICJs begun before the war was completed afterwards, again with South African collaboration. A structural service-life extension program permitted another decade of use. Some Nesher features were also added. Production of Neshers tapered off with the last of 61 delivered in 1975 as production turned to an alternative.

Replacement Atar engines for the Mirages and Neshers were becoming scare and the power plant aging. A re-engining program was considered, but no suitable alternatives were found that would not require costly and time-consuming airframe alterations. There was also a desire to extend IAI fighter production for economic reasons and to ensure defense needs were not entirely at the whims of a foreign power. The F-4E's General Electric J79 was a near-suitable alternative and its greater thrust with lower fuel consumption a boon. Its size still required a substantially reworked fuselage and this was explored through Mirage testbed modifications starting in 1970.

With the decision to proceed with a new aircraft based on the Mirage/Nesher powered by the J79, IAI lined-up vendors and contracted with USA manufacturers for assistance. Dozens of American engineers were in Israel for a portion of the design and development. General Electric also worked-up a revised model of the J79 to better fit the narrow fuselage while Bet-Shemesh Engines setup for license production. A preproduction aircraft was created by converting a Nesher that flew in 1973.

Focus for what was called the *Kfir* (Lion Cub) shifted to a more modern multi-role warplane seeking some of the features appearing in fourth-generation warplanes such as a computerized nav-attack system, a capable radar, Head-Up Display (HUD), stability augmentation, improved maintainability and survivability, pressure refueling, integration of modern weapons, bomb damage assessment camera, and self-protection electronic warfare (EW) systems. The Air Force preferred such a strike aircraft that had power to quickly egress the attack area and could maneuver effectively when engaged by interceptors. An early production example was created on the Nesher production line, flying in 1974. However, by this point, the Kfir would be a second-line asset at introduction. The project went forward principally because of the desire to have a low-cost/low-end local alternative to American warplanes and because of considerable political backing.



The Israelis were keen to sustain their combat aircraft manufacturing capability and build on the experience with the Nesher. They developed the Kfir that was a spinoff of the Nesher, but with an American engine and greater air-to-ground capabilities. Aircraft 786 is one of the baseline airframes operated by 109 Squadron. (Ra'anan Weiss Collection)

Kfir production began in 1974 with first delivery in 1975. However, the fighter pilots quickly judged the aircraft inferior to the Mirage, and even the initially disappointing Nesher (though it proved very successful in combat), owing to aerodynamic deficiencies that degraded maneuverability. This assessment and two Kfir accidents in December 1975 prompted concerted corrective actions. These included aerodynamic changes with incorporation of nose strakes, canards on the inlets, and wing leading edge sawteeth replacing slots. The strengthened frame to carry the canard loads also allowed introduction of two additional hardpoints for a total nine. This C2 variant began to be delivered in 1977. It was assessed as uneconomical to modify the baseline production aircraft (27 machines) that got only nose and inlet strakes. This did little to improve their drawbacks and those baseline machines were withdrawn as soon as there were sufficient C2s.

Kfir production was typically at a rate of two per month. As squadrons took on C2s, they sent baseline machines to other units. The Neshers (save for five trainers) were sold beginning in 1978 for required revenue as the Kfirs replaced these plus some Skyhawks.

All the work modifying aircraft and incorporating new weapons created a tremendous developmental flight test workload. The Flight Test Unit became the 601 Flight Test Center (acronym-derived name MANAT) in 1974, still at Tel Nof AB. Previously, test aircraft fitted with costly instrumentation continued to be employed as operational machines, and two such F-4s were lost in October 1973. Thereafter, dedicated flight test aircraft were assigned to 601.[5] Modifications were commonly undertaken by AMU 22 (Aircraft Maintenance Unit) or contractors. A steady stream of pilots and engineers were sent to foreign test pilot schools for training. In future decades, the IAF ensured one aircraft of each new fighter type procured, and likely others, came instrumented for flight test.

An Air Force team named Modern was assessing materiel needs in light of the Yom Kippur War experience.[6] The long-standing guidance to procure multi-role warplanes was no longer considered the best course given the threats. Aircraft like the MiG-23 and MiG-25 being introduced into Arab inventories needed to be met with superior resources. The American willingness to provide Israel with its latest weapons, even as its own forces were being equipped, provided a unique opening to acquire the F-15 Eagle. Although its large size caused some pause, the powerful radar, with look-down/shoot-down capability, and ability to carry eight air-to-air missiles, won the day. Still, the purchase was the source of a national debate over priorities and choices, especially given its $30 million unit cost (including training and support equipment). An order for only 25 could be borne by the budget.

Given occasional combat with Syria, and other regional threats, the importance of introducing the capabilities represented by the Eagle was so high that the IAF purchased four refurbished F-15A developmental test aircraft. These machines were taken up at the end of 1976 and operated with just five pilots for nearly a year. The new production jets, including two dual-seat F-15Bs, were delivered at two per month from 1980 through 1981.

The opportunity to increase the fleet came in 1978 as a measure of balancing USA arms sales to Arab nations and ameliorating Israeli security concerns in pulling out of Sinai. Again, the cost limited the buy to a relatively small nine F-15C and six two-seat Ds delivered in 1981-1982. For these jets, the IAF adopted Conformal Fuel Tanks (CFT) and began manufacturing these in-country. Fit in the “arm pits” of the aircraft, they contributed fuel volume without taking up underwing stations.

During the 1970s, the Soviet Union performed MiG-25R and Yak-26 overflights of Israel and Sinai at very high altitudes and/or airspeed. These were a persistent frustration for the IAF as they could not reach the intruders with interceptors or Hawk SAMs. Attempts were made with stripped-down F-4Es firing AIM-7s, but this was also fruitless. The performance-enhanced F-4X was to be one answer, but that program was dropped for want of funding. Introduction of the F-15A sitting Quick Reaction Alert (QRA) with advanced AIM-7 missiles spelled the end of these intrusions. American overflights by U-2 and SR-71 were equally frustrating, but eventually ended.

Acquisition of the F-15 helped to ensure IAF preeminence in air combat over its likely adversaries. Its performance also ended high-altitude reconnaissance over the country by foreign powers. These 133 Squadron machines are likely seen in the late 1970s at Tel Nof AB. (Israeli Air Force via Lon Nordeen)

The F-16s appeared ideal for the IAF and were ordered in large numbers. Eagerness to get the jets as soon as possible meant little opportunity to introduce changes unique for Israel. Their integration was quick and at a fortuitous time with respect to operational challenges. This 253 Squadron F-16A is likely landing at Ramon AB. (Ron Feldman Collection)

Selection of the F-16 for the light fighter-bomber role was also met with conflicting opinions. However, the palatable price and the fact it shared the same basic engine with the F-15 were compelling. The order for 67 F-16A and eight Bs reflected no hesitation. The USA government agreed to the sale in 1979 as part of the Camp David Accord, but rejected Israel's request for licensed production. Yet, it still displayed the curious behavior of rewarding negotiated peace with the sale of massive quantities of arms to both parties. Although Israel had ambitions to introduce much local content into the jets, this gave way to American constraints and the need for the earliest possible delivery. However, they did get a pair of flare/chaff dispensers added. The Falcons arriving in 1980-1981 at a rate of four per month – a year earlier than originally planned due to fortuitous production scheduling when Iran's Islamic Revolution caused their order to be cancelled. Ramat David Air Base (AB) had to be renovated to accommodate the high-tech fighters.

The Americans generally provided the IAF the latest models of the Sparrows and Sidewinders with all these aircraft purchases. Israel continued its indigenous Air-to-Air Missile (AAM) development with the infrared-guided (IR) all-aspect Python 3 that entered service in 1977.[7] Essentially equivalent to the AIM-9L, the Python was larger and heavier, plus more costly. These were integrated onto the Kfirs and F-15s. The Phantoms ceased carrying AIM-7s and the IR missiles were generally for self-defense. A projecting mount in the forward Sparrow cavity was devised for F-4E IR missile carriage when underwing configurations precluded employing the usual mounts off the inboard pylons.

As the IAF analyzed their Yom Kippur War performance they concluded that ground-based surveillance and ground control intercept radars would not be adequate in the future, and would require excessive manpower if expanded to meet need. The loss of the Sinai eliminated forward-based radars and cut warning time further. Attacks on radar stations in the Sinai during the war had also been worrying. An airborne radar would enhance surveillance range while tracking multiple low-flying targets early enough to affect successful intercepts. Coupling the radar with communications and appropriate command and control (C^2) computer assets would allow the enemy's airborne disposition to become visible. Limited airpower resources could then be massed against the attacking forces' critical center in a decisive manner with interceptors vectored to the most urgent airborne threats. This sort of real-time C^2 had been lacking in 1973. An airborne radar could also allow tracking of long-range aircraft operations.

All these considerations led to seeking an Airborne Early Warning (AEW) aircraft. The Americans could offer the E-2C Hawkeye with its powerful radar covered any airspace the IAF would likely operate in, tracking more than 200 targets and more than 130 simultaneous engagements. It could also identify and locate emitters and provide Electronic Countermeasures (ECM). The IAF took on four E-2Cs which, at $20 to $25 million each, were the most expensive aircraft purchased to that time. Once in service, it was found that the radar was less effective over land than as the United States (US) Navy operated it over the sea, with ground clutter in the return complicating the operators' task. Over the years, the Israelis are said to have augmented the baseline capabilities in addition to adopting upgrades applied by the US Navy to its fleet. The Hawkeye still required a considerable realignment of the IAF's radar network and intercept practices. It was also reported that, by summer 1982, the Hawkeyes could downlink data to the F-15s who, themselves, used their own radar to fill in coverage gaps. The fighter could then better direct formation elements to advantageous intercept locations and pass data to F-16s. The two-seat F-15s may have been important in such roles. A new command center helped in processing and displaying the vital information more quickly.

A new attack element was sought in an effort to allow the Air Force to directly affect battles by mobile forces, possibly at night. The TOW missiles introduced in the last days of the Yom Kippur War, operated by ground forces, left an impression. This was a wire-guided missile and so firing from fast jets was not practical. Operating at low altitude under the SAMs to hit vehicles required slow flight with terrain masking. The US Army was integrating TOW onto their Vietnam-era AH-1G HueyCobra attack helicopters with two quad-launchers and a nose telescopic IR sight with helmet-directed targeting. The launchers on the stub wing outer hardpoints left the inboard for rocket tubes on the helicopters which became AH-1Qs (later redesigned AH-1E). Such an attack helicopter promised nape-of-the-earth (NOE) flight, possibly at night using NVGs, and operations under weather that usually negated fixed-wing attacks.

The IAF sent an evaluation team to America for introduction to the AH-1Q plus US Army attack helicopter doctrine and tactics. Israel had explored such arming options for helicopters in the mid-1960s, testing French SS-11 missiles on Alouettes and Bell 47s, in addition to heavy guns and rockets, but the purpose-built Cobra had much more potential. Adopting a cautious approach for this fundamentally new air combat dimension, the service acquired six AH-1G gunships for closer assessment, AH-1Qs being as yet unavailable. The Gs had a 7.62-mm minigun and 40-mm grenade launcher in the chin turret, and rocket pods on the stub wings. These also had armored seats and, as a measure against the SA-7, the diverted "sugarscoop" exhaust.

Delivered in 1975, the AH-1Gs were evaluated for six months. The team especially looked at the potential for night low-level flight in searching for mobile targets. Their report made clear the TOW, with 2.3-mile (3.7-km) range, would be essential to make the helicopters worth procuring. The standard AH-1G kit, lacking suitable navigation and low-light vision systems, not to mention TOWs, made the helicopter too vulnerable in that it had to approach too close to targets to be effective, should it hope to find and destroy targets such as tanks. Yet, this still appeared the only potential path for the IAF to effectively contributing to armor battles in their opening stages and provide accurate close air support.

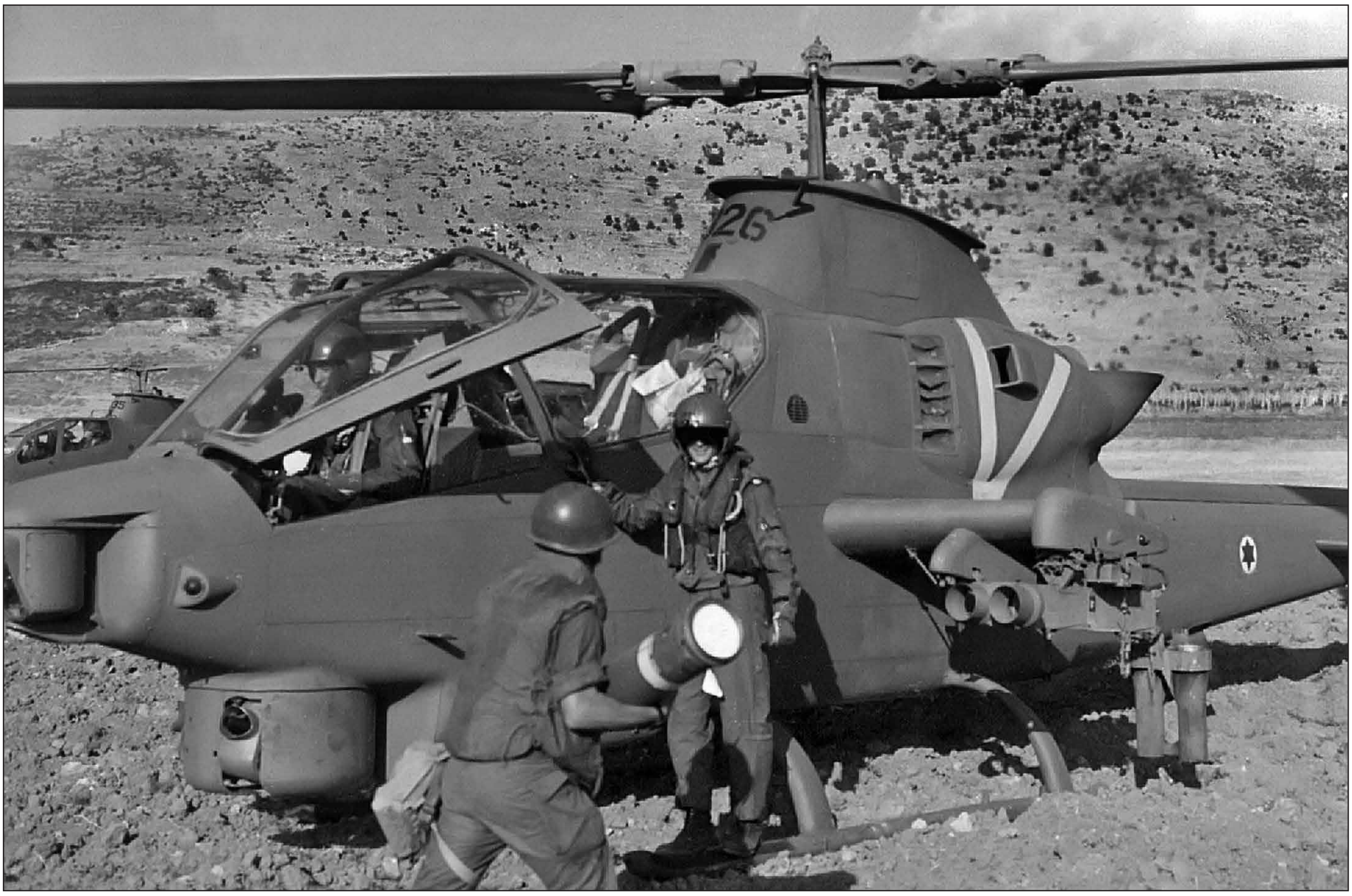
After a review (without the team's formal report), the IAF chose to continue exploring the attack helicopter potential with an order for six "Up-Gun" AH-1S helicopters that possessed TOW. These included uprated engine, and a 20-mm chain gun replacing the chin turret. The six Gs were also to be upgraded with TOW, though retaining the minigun and grenade launches.

It would be over a year before any of these aircraft would be on hand. In the meantime, the Gs and some newly acquired OH-58Bs (military JetRangers) were put to work building IAF attack helicopter doctrine and tactics through exercises with the armored forces leaning towards anti-tank missions. Additional personnel were sent to the USA for training, focusing on TOW employment and night operations. Unlike the American practice, the Israelis choose to make both crewmembers pilots. All these efforts extended through most of 1976. This comparatively slow progress was the result of skepticism on the part of the fighter pilots who ran the Air Force and the Ministry of Defense (MoD) that struggled to contain the burgeoning defense budget.

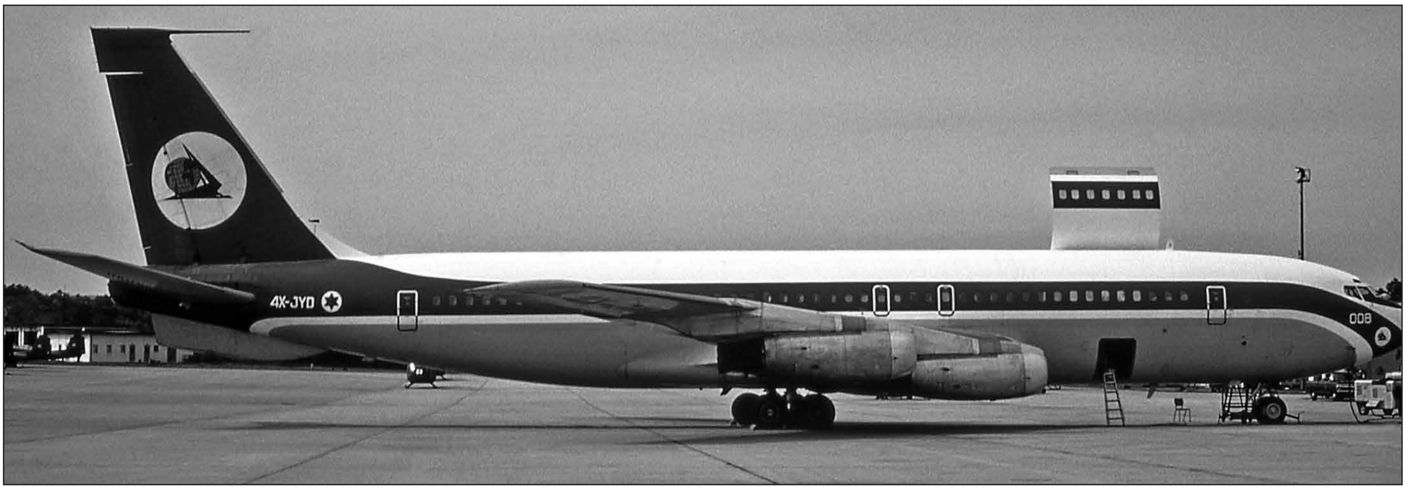
The AH-1Ss began arriving in 1978, fitted with RWR. Training resumed, to include participating in large-scale armored maneuvers. The 160 Squadron was considered combat ready in spring 1979 with six helicopters. They then trained for a variety of missions and found initial use in striking terrorist targets and supporting ground units doing likewise.

In the latter-half of 1977, an order was placed for 18 more AH-1Ss to fill out the squadron and reach an operationally significant force. However, the USA dragged its feet on approving the sale, and the high cost was worrying. An alternative was found in the Hughes 500 at a third the price. These Defenders carried four TOWs, but no other armament unless they displaced the missile pods. Performance did not match the Cobra, but they were quieter, more agile, and easier to maintain. These 30 500MDs arrived in 1979 through 1980 and the Cobra order was cancelled. Eventually two units, 160 and 161, operated the 500s beside the Cobras.

The 161 Squadron worked with armored outfits in the north of the country while 160 did the same in the south, in close relationships. A lead helicopter could land beside a command vehicle for face-to-face coordination. To ensure the maximum time-on-station, fuel, ammunition, and other essential support for the helicopters moved forward with the advancing forces such that the aircraft did not need to repeatedly return to its primary air base. A special IDF anti-tank combat group, *Koach Peled*, was also formed. The IAF provided the group additional mobility with



Seeking to enhance their night fighting capabilities and more effectively contribute to mobile combat under enemy SAM umbrellas, the IAF sought the attack helicopters developed by the US Army. They experimented with AH-1Gs, later upgrading with TOW missiles, while ordering AH-1Ss. This image shows one of the upgraded Gs, its nose turret devoid of the minigun and grenade launcher, while an AH-1S rests in the background. Note the RWR antenna on the nose. (Ra'anan Weiss Collection)



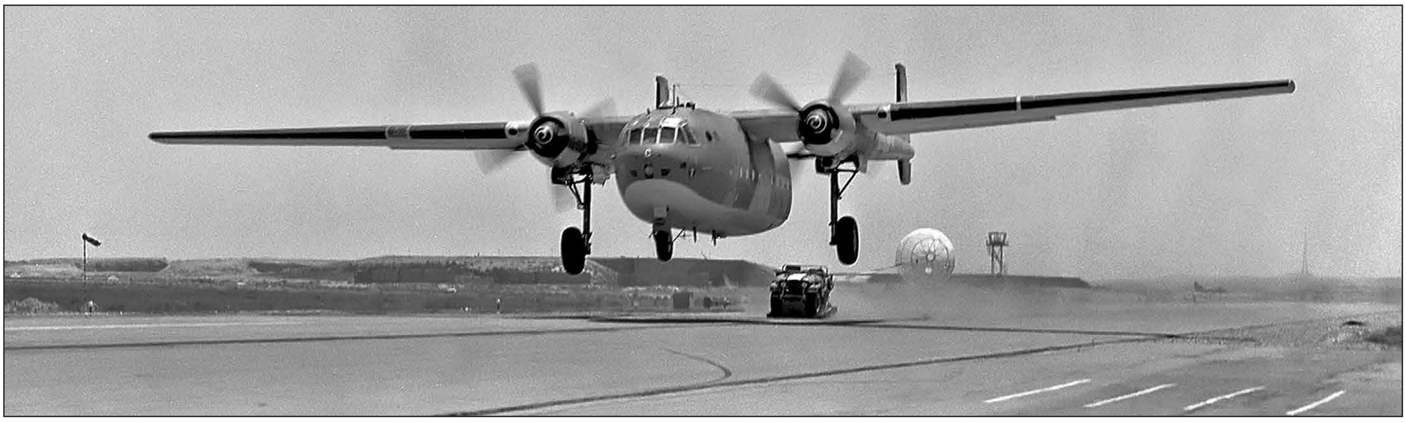
The work of the old Boeing 377s and C-97s had grown tremendously, but those old airplanes were becoming too costly to operate. Given the El Al and IAI familiarity with the Boeing 707 airliner, this was a good choice for large capacity over-seas transport. Israel Aircraft Industries overhauled all the used airframes acquired, putting cargo doors in some. Aircraft 4X-JYD 008 of 120 Squadron was among the first. Photographed in 1976 at a foreign locale, it is a 707-124 that entered service at the beginning of 1972. (Military Aircraft Photographs)

Hueys positioning tank killer teams armed with TOW missiles or rocket-propelled grenades (RPG) while the CH-53 could bring in jeeps mounting TOW and crews. Deployed at key locations, such squads could delay enemy movement. An integrated team consisted of the attack helicopter squadrons and three battalions of ground units equipped with missiles. The squadrons also contributed detachments to operate at helo refueling bases on the border with Lebanon where they sat QRA. Given with their forward operating base numbers, these were Beit El 31, Bezet 33, Biraneet 11, Dalton 23, and Gibor 16. Other forward operating bases were Ami'ad 20, Hatzeba 32, Machanaim 24, Madochot 14, Meggido 7, Revaya 13, and Shdema 19.

The Dakotas soldiered on in 122 Squadron; for many missions they remained inexpensive to operate. They reach a fleet high of 20 aircraft in the latter half of the 1970s. Growing ties with America meant more practical transoceanic transports than Stratocruisers were required. Experience with the Boeing 707s during the Yom Kippur War, the national carrier El Al's operation of 707s with many of its pilots also IAF reservists, and Israel Aircraft Industries' (IAI) knowledge from performing cargo conversions of the airliner, all made this a good choice. The Air Force began acquiring retired 707s with IAI performing necessary refurbishment, militarization, and modifications, and then maintained the machines under contract. Apart from personnel transport, cargo conversions were common. Special modifications included an airborne medical facility, Very Important Person (VIP) accoutrements for the national leadership on international visits, Command, Control, and Communications (C^3), tanker, and EW roles. Based at Lod, this became a full-fledged Wing of heavy transports.

Stratos and Noratlases were displaced as more Hercules and 707s took on their roles, including aerial refueling. The loadmaster flight within 120 Squadron was formalized as Unit 757 to man the growing number of heavy transports. The Hercules was the primary platform for paratroop assaults and so were employed for jump training. The IAF trained to perform many forms of airdrop including low-altitude parachute extraction system and off-loading M-113 armored personnel carrier (APC). Israel's C-130s were one of the last users of the Jet-Assisted Take-Off. Ignited on takeoff, the rockets provided extra thrust to allow very heavyweight departures or exceptionally short take-offs.

One of the IAF's C-130Hs, 4X-FBD 011, crashed on the night of November 25, 1975. Flying across the Sinai in foul weather with 11 passengers and a crew of nine, it impacted 15 feet (5 m) below the summit of cloud-obscured Jebel Hilal mountain. Cause of the accident was assessed as pilot error.



The Israelis always strove to get the most utility from every airplane they operated, often developing capabilities rare for such a small force. One example of this is the 103 Squadron Noratlas performing a low-altitude parachute extraction of a jeep. This capability was continued with the C-130s. (Ra'anan Weiss Collection)

The IAF acquired its first KC-130 in 1976 and continued operating them to date of writing. They had a vital role in aerial refueling of the assault helicopter fleet of CH-53s and UH-60s fitted with aerial refueling probes. The purpose-built KC-130H 545 was among the first two, here refueling a pair of 118 Squadron Sea Stallions. (Nir Ben-Yosef Collection)

The eight CH-53As delivered during the war were joined by two S-65Öe acquired from Germany. Adaptation to IAF needs saw modifications to add external fuel tanks and the ability to mount an AR probe, removal of the tail boom fold feature, added door gun, a rescue hoist, and accommodations for the flare grenade dispenser tubes common to IAF helicopters during this period. Some were fitted with the means of mounting a Forward-Looking Infrared (FLIR) television (TV) camera on the port side of the nose and an IR lamp on the starboard side to facilitate safer NOE night flying. Low-light TV has also been attributed to the IAF Sikorskys.

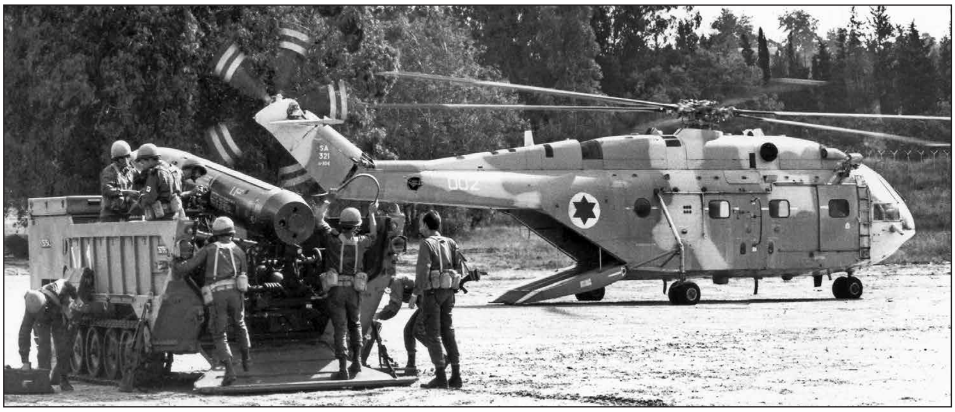
It was desirable to sustain the Super Frelons, but spares were becoming scarce and some of the helicopters were being cannibalized. Ten of the remaining machines were re-engined in the mid-1970s with the General Electric T-58, among other changes to improve maintainability. Two of the helicopters were garnished as VIP transports for the delegations visiting Egyptian territory for negotiations.

Two CH-53s collided over Mahanayim airport on April 19, 1974, with one machine crashing and all eight aboard perishing. One of the worse air disasters in Israeli history also involved a CH-53 when, on the night of May 11, 1977, the helicopter went down in the Jordan Valley owing to pilot error. The machine had a remarkable 54 persons onboard (four more ordered off to avoid overloading). Aside from a 10-person flight crew, many of these dead were paratroopers and senior IAF officers. Because of this "Disaster of the 54," the IAF limited the 53's capacity to 33 passengers plus crew. However, two more fatal crashes over the next two months created a crisis as aircrew lost confidence in their aircraft and the regard for which their mission was held within the Air Force. A year of hard work addressed these issues and firmed up the vital force.

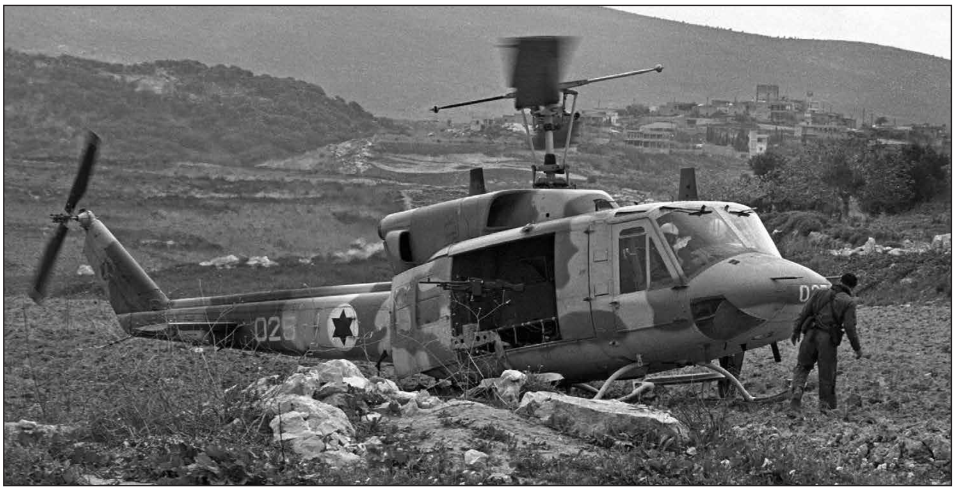
Efforts to improve the survivability of the Bell 205s saw introduction of sugarscoop exhausts and RWR. However, they had not done so well in the desert heat. They were replaced with Bell 212s offering the safety and performance advantages of two engines plus a larger cabin. They received all the Israeli features to include retractable steps, door guns, and flare tubes. They also got the latest RWR and the IR countermeasure to break missile lock. As operations in southern Lebanon expanded, far north airports began to be used for flights of light-planes and helicopters. Eventually 212s were sitting alert at the border heliports.

The liaison helicopters were also bolstered with 11 Bell OH-58Bs and 10 206Bs while the Alouettes were retired. As the Bells would continue to be operated near the battlefront, they also received the flare tubes. As Do.27 numbers dwindled, more 28s were acquired. A dozen Beech Queen Air B80 twins were purchased in 1974 for light transport, VIP duties, and several could accommodate litters with medical attendants. They went to a second light-plane unit, 135 Squadron, focused on the transport and liaison mission. Left with the Dorniers, 100 Squadron concentrated on observation and surveillance. These two units then made up a light transport Wing at Sde Dov. Faster VIP movers were two IAI Westwind business jets.

After the war, there was contention between the Air Force and A'man (Army Intelligence) over the flow of reconnaissance imagery and other information vital to the planning and conduct of air operations. Some accommodations were made, but the IAF also began exploring a new approach. Further development of mini-RPVs was undertaken, but it was the late-1970s before the MoD began turning serious money along this avenue. It began with purchase of an American developmental system, the Ford

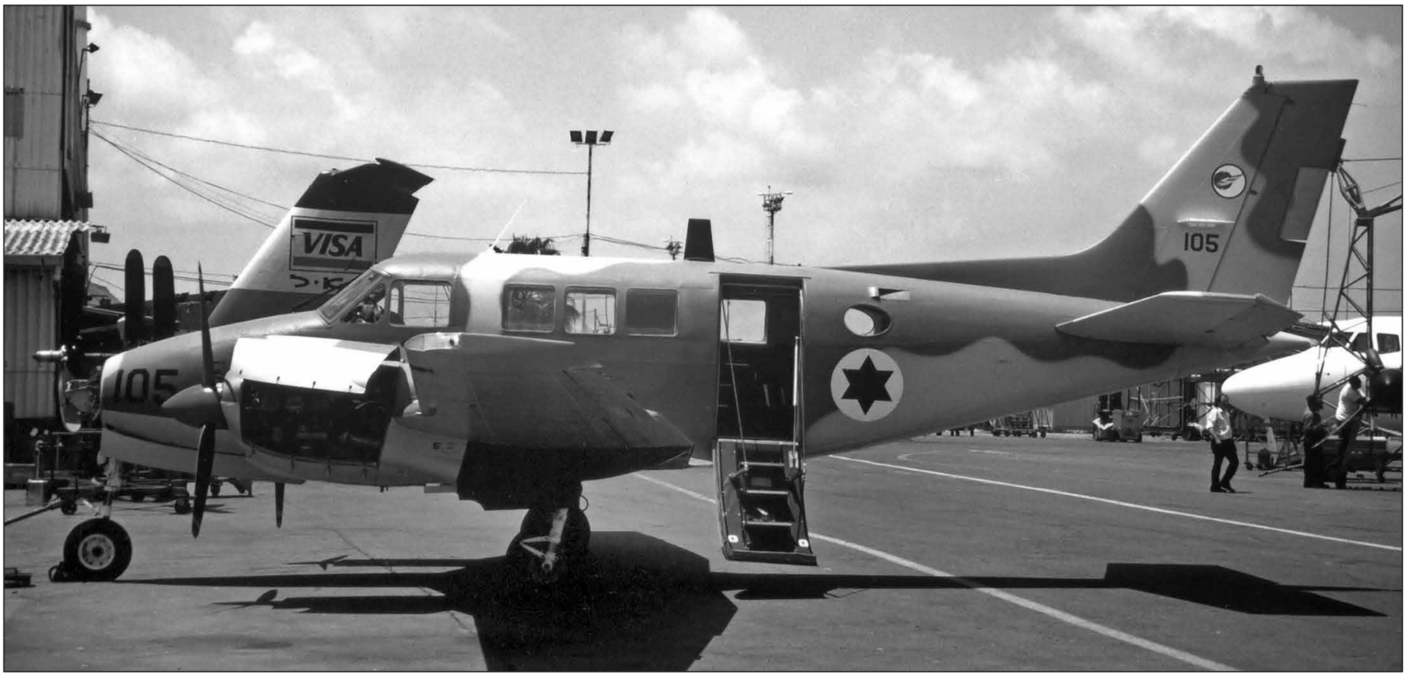


In another example of the Israelis heavily modifying and sustaining an old aircraft rather than buying new, the Super Frelons were re-engined with the American T-58 turboshaft. This was partially done because of the difficulty in obtaining spares for the original power plant, to improve performance, to avoid the high cost of new helicopters, and partially to create work for home industry. Only 10 aircraft were reworked in 1974-1975 and they served until 1991. This 114 Squadron example beside a Lance missile crew shows the modification via the single versus dual exhaust on the starboard side of the engine deck. (Ofer Zidon Collection)



The Bell 205 Huey was replaced with the twin-engine 212. As with the earlier model, the Israelis made modifications, the most obvious paralleling those from the 205 being the skid step (though retractable) and a door gun. The gun was the common IDF crew-serviced squad machine gun. This 124 Squadron helicopter has set down on a slope and the crew chief is checking the condition of the surface with rotors turning. (IAF Spokesperson via Ofer Zidon)

On July 13, 1990, Captain Hagai Morry, a 33-year-old reservist reportedly despondent over personal problems, took a 100 Squadron Do.28 from Sde Dov AB without permission and went missing. The largest air, sea, and land search in Israeli history followed. A week later, the wreckage and body were discovered on the western slopes of the Golan Heights in an apparent suicide. A similar event had occurred on June 11, 1949, when a cadet, dismissed from the pilot course, stole a Cub and flew it to Turkey. The thief was returned, but it is unclear what became of the Piper.



For higher capacity and speedier liaison flights, the IAF acquired a dozen Beech Queen Air twins in 1974. These B80s flew for 30 years. Aircraft 105, under maintenance at Sde Dov AB, shows the 135 Squadron badge and colors typical of the period. (Military Aircraft Photographs)

Aerospace Prairie II. Examination of and operational experience with this system supported development of domestic products. These featured video cameras with a telephoto lens to allow real-time surveillance from a tiny and slow airplane possessing an equally small radar and visual signature. By 1981, the IDF were operating the Mastiff and Scout for field-testing. Each carried video cameras and FLIR sensors, flying for about seven hours.

Air defense of IDF mobile elements had been problematic during the Yom Kippur War owing to the IAF being stretched thin and avoiding enemy anti-aircraft (AA) assets. It was unclear that the protection offered in the past, which had never been perfect, could be guaranteed. Consequently, mobile air defense assets accompanying Zahal troops were added to defend against enemy attacks that got past preoccupied interceptors.

Shifts

In just a few years following the upset of the Yom Kippur War, the IAF had grown again and adopted many new advanced weapons. Its capabilities at stand-off attack with PGM, contribution to tank battles, and night combat, had all increased markedly. Israel's industries were supplying important defense products to include EW systems, AAMs, and the Kfir fighter-bomber. With so many personnel having served in the IDF, or still serving as reservists, and business leadership made up of many retired senior officers, Israeli industry had an exceptionally close relationship with the MoD. It could respond quickly to new requirements or revise existing equipment based on combat results. The IAF began to feel prepared to meet the challenges it had confronted in October 1973 with more success, contain the enemy, and help in successfully concluding a war more quickly and with fewer losses. They were also more closely tied to the USA for its defense needs, sustaining the weapons it had received and supporting the enormous defense burden with billions of dollars in aid each year. This also made the state vulnerable to suspension of all such support as a tool of political persuasion. Equipment and munitions deliveries were temporarily withheld many times over the decades when employment of USA-supplied weapons were judged to have exceeded legitimate self-defense exigencies. However, there was never a rupture in the relationship and the brief embargoes were assessed by outsiders as "hand-slap" measures for the sake of appearance.

An extensive review of doctrine, planning, and strategy was undertaken by the Air Force. Considerable effort was expended in exploring new tactics to answer the deficiencies the Yom Kippur War had revealed. Great efforts were made at improving C^2 while the intelligence branches struggled to deliver more timely products to field commanders. The Air Force moved its intelligence activity to a full Group under a Brigadier General and gained more authority over products directly affecting its missions.[8] Standoff weapons, PGMs, and countermeasure systems offered new capabilities to be considered into the operational planning. Suppression of Enemy Air Defense (SEAD) was given particular attention, requiring the integration of new systems and strenuous training. The PGMs and attack helicopters finally gave the IAF reliable quick-reaction tools to deal with armored formations. The IAF continued to be known for its high training hours and realism. However, changes in fundamental tactics, which occurred several times for many missions over a just a few years, carried the price of elevated training accidents.

Some of the attrition was still due to overly aggressive and undisciplined behavior. Foreigners who gained insight into the IAF continued to be struck by the youthful personnel, carefree regard for standard practices, and lax discipline. Mention of Israeli pilots and flight operations usually brought wry smiles or rolled eyes, yet respect for what that service accomplished given its circumstances.

After the war, the IAF made clear that ground forces must not rely on the Air Force for close air support in the initial period of a conflict as they battled for air superiority. Liaison with surface forces was also improved in seeking optimal combined-arms solutions. Zahal as a whole was addressing the optimum allocation of weapons to targets; ensuring aircraft were not used in situations where artillery or rockets would serve. In 1975, Major-General Peled gave the IAF's prioritized missions as air superiority, strategic strikes, deep interdiction, and Close Air Support (CAS). To simplify target identification and coordination with ground forces, the IAF would attack no closer than 5 miles (8 km) from IDF units – a figure that likely evolved over the years. Firepower organic to ground maneuver units were to engage closer targets, and those systems were suitably addressed. The attack helicopters, with their slower speed and direct fire, and PGMs from fighter-bombers, appear to have altered this equation later.

At first, the attack helicopters were not considered essential for CAS since the IDF seemed to have sufficient firepower with their forward combat elements. However, successes with the choppers during actions in Lebanon convinced IAF doubters that these could perform the mission while fast jets serviced interdiction targets and performed tasks requiring heavy ordnance. Gunship capabilities became particularly important at providing rapid-response and accurate fire support to squads operating deep inside Lebanon or assisting in the rescue of downed aircrew. Until the 1990s, this remained the extent of the IAF helicopter contribution

The Magister was updated in the 1980s to become the *Tzukit*, and soldiered on in primary, basic, and advanced flight training at Hatzerim AB. Dismissed from any combat role, it took on high-visibility colors. (Military Aircraft Photographs)

The Piper Cub continued to serve in the pilot candidate-screening role until 2003 when replaced after 55 years. They had been a contract resource for the last 10 years or so with about 35 machines maintained. The Cubs wore this training color scheme since the mid-1970s, though usually with the Flying School badge on the tail. (Ra'anan Weiss Collection)

because their numbers remained relatively small and only the few Cobras had guns and rockets.

During the Yom Kippur War, the IAF's characteristic centralization of command – with the Air Force commander previously seen personally coordinating individual missions from a spartan center at Ramleh AB or elsewhere – had to be revised. The air war had grown too vast and complex. Initiative had to be pushed to lower echelons in responding quickly to rapidly changing situations. The IAF worked up a battle management center to coordinate and control attack missions, generate reconnaissance sorties, and act expeditiously on the results. Centralized air battle management for air-to-air engagements was addressed with the E-2C and Boeing 707s converted as airborne command posts. The air elements were integrated with ground-based radar and other assets.

In its relatively small theater, with limited numbers of threat systems, Israel was able to respond quickly to a changing EW environment with high-quality local technology. This eventually lent confidence the IAF could carry out its missions with adequate defense suppression. These technological resources also permitted it to tie together ground-based and airborne intelligence collection sensors into a very responsive C^3 network. Attention was also paid to ensuring excellent aerial reconnaissance with quick access to results. Reconnaissance and EW assets were equipped with datalinks for rapid analysis and dissemination of the information to commanders and combat units. Improvements in this network continued as Information Warfare becomes a potentially deciding factor in victory. Moreover, the Air Force worked to reduce its dependence on the Signal Corps for communication resources.

New Realities

Operational security continued to be a priority in the IAF and within the consciousness of most Israelis. Apart from continuing to conceal numbers of aircraft, squadron basing, identifications, and regalia, the names of personnel were also redacted and their faces concealed in photographs. Security topics were not discussed with foreigners and photography of military subjects was forbidden. Greater order and discipline were instilled in Zahal to include adherence to military standards and orders.

While the IAF was modernizing its order-of-battle (ORBAT) and improving its tactics, its neighbors were making similar efforts. Syria remained openly hostile with the chance of a negotiated peace seemingly remote. This was further diminished when Israel extended its domestic law to the Golan, essentially annexing the territory. Syria invested heavily in air defense and by 1982 had three times the number of SAM batteries as in 1973. They armed the Palestinian factions in Lebanon with increasingly sophisticated weapons. Israel was especially displeased with USA sales to Saudi Arabia of F-15s, KC-707 tankers, and especially the E-3A Airborne Warning and Control System. While the

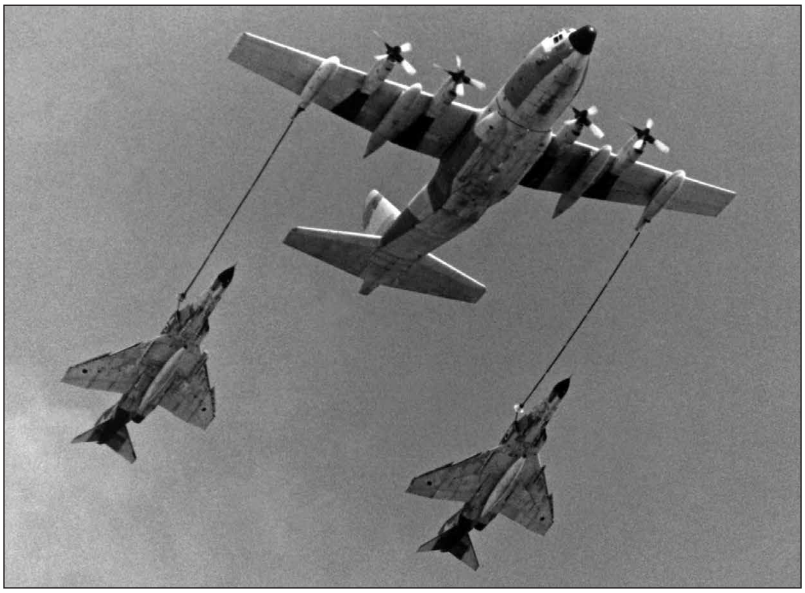
On May 1, 1983, F-15D 957 suffered a mid-air collision with an A-4. The Skyhawk immediately exploded and the pilot was killed. The Eagle pilot, Ziv Nedivi, struggled to regain control and could only manage to fly with near full cross-control and afterburner. The crew (including navigator Yehoar Gal) decided to stay with the airplane and managed a landing at Ramon AB five minutes after the mishap. Touching down at twice the normal approach airspeed caused the tailhook to separate on contacting the arresting cable. Yet, brakes remained and the pilot stopped just 33 feet (10 m) from the departure end barrier. Only then did the pair see that their starboard wing had been sheared away. The aircraft was moved to the AMU at Tel Nof and repaired in two and a half months, Nedivi performing the checkout flight.

Colonel 'Zorik' Lev, as commander of Ramat David during 1970, had collected many historic IAF aircraft into an unofficial collection. After Lev's death in combat, the collection languished until 1975 when IAF leadership decided to create a Historical Flight. This finally came to fruition in 1977 under the guidance of Brigadier General Ya'acov Terner, then commander of Hatzerim AB. Lev's aircraft were moved there in 1978 and joined by others gathered from around the country. Terner remained to manage the flight following retirement. It was still many years raising funds and creating proper displays before the Israel Air Force Museum was opened to the public in 1991. It kept several aircraft flying for a time, including Ezer Weizman's famous black Spitfire.

American efforts to bolster the moderate Kingdom to balance growing radical Islamic tendencies in the region paid dividends for USA foreign policy, the capabilities complicated IAF contingency planning. The pro-Israel lobby in Washington was sometimes successful in at least temporarily affecting American foreign military sales.

While seeking to improve its ORBAT, the IAF was not idle in the field. Clashes with neighboring states became rare while attacks on terrorists and Palestinian irregulars in Lebanon became commonplace. Many of the new weapons and tactics got combat exposure in that theater. Reconnaissance and overflights were routine there while less so over other surrounding nations.

Israel had always faced threats beyond the states on her immediate borders and non-state terrorist groups acting on the international stage. When action was required to forestall danger to her citizens, Israel had normally employed her intelligence services for acts of sabotage and intimidation. One such threat was Iraq that had participated in three wars against Israel and remained virulently hostile. When it was learned Iraq was building a nuclear reactor and had a secret atomic weapons program, Israel energized its traditional clandestine methods as well as appealing to the international community. When those failed to yield the desired results, she explored the option of bombing the Osirak reactor 600 to 650 miles (966 to 1,046 km) distant. It was felt the survival of the state was at risk.



The KC-130Hs acquired in 1976 were considered for refueling F-4Es in a planned 1979 strike on the Iraqi nuclear reactor facility near Baghdad. Aircraft 522 is shown refueling a pair of Phantoms equipped with the Israeli AR probe. As with most Hercules operators, the inboard external tanks were a permanent fixture. (BIAF – Israel Aerospace Magazine)

Planning for the strike began in November 1979 with F-4Es refueled in-flight. Mission rehearsals began early the next year, the fighters practicing flying exceptionally long missions over the Mediterranean to Italy and Greece.[9] The tanker would have been vulnerable and any AR very difficult at any altitude where it would have gone unseen by radar of the nations being crossed. Reconnaissance of the target by RF-4s was conducted. Arrival of F-15s and F-16s, with much greater unrefueled range and bombing accuracy, provided a safer alternative – though the F-16s would be at the extreme limits of their range and anything extending mission duration could make fuel state critical. Revised planning began immediately and training runs against a mock target first executed in August 1980.

Four mission dates were set over the next nine months, but allowed to pass owing to inopportune world events or political factors. In May 1981, the pilots were in their cockpits before the scrub was announced. The Air Force and intelligence agencies warned against continuing delay without risking leaks of Israel's plans. The June 7, 1981, strike was felt to be the last opportunity before fuel rods were loaded in the reactor core and the scattering of radioactive material would be risked.

The mission employed two F-16A quartets from two squadrons, each escorted by six F-15As. It is believed that national and squadron markings were obscured. E-2Cs monitored the flight path, a 707 airborne to hear brief radioed reports, and CH-53s at ready for combat search and rescue (CSAR) and reportedly forward deployed for rapid response. The fighters launched from Etzion AB, crossing Saudi Arabian and Jordanian territory. The ingress at very low altitude was all over remote areas. The F-16s carried wing and centerline tanks plus two 2,000-lb (907-kg) unguided bombs and a pair of AIM-9L – an unproven configuration for which Israeli flight testing found safe conditions in which to jettison the tanks. The F-15s had CFTs and a full complement of AAM, flying Combat Air Patrol (CAP) and providing jamming and post-strike photography. Apart from some ineffectual anti-aircraft artillery (AAA), there was no air defense response, yet the F-16s ejected chaff during their bombing. Most bombs struck the target and destroyed the reactor. The return was at a fuel-economical altitude, ending the three-hour daylight operation.

The Israelis had inaugurated a long-range strike capability.

Israel had planned to strike the Iraqi nuclear facility with F-4s, but the range of that third-generation fighter would have demanded aerial refueling. That complexity plus forcing of the attack jets to a higher altitude and slower airspeed added considerable risk. The new F-16s could make the trip without AR. This 117 Squadron F-16A is in the company of 105 Squadron Phantoms in October 1983 at Hatzor AB. (Ra'anan Weiss Collection)

CHAPTER 2

LEBANON QUAGMIRE

Israel kept a wary eye on its neighbors through the late-1970s and into the 1980s, and there were occasional clashes. However, they were more and more focused on the growing terror threat. This meant more small-unit and special forces operations supported by the Air Force and Navy in combined-arms missions. Lebanon had become the base for many terrorist groups that had to be confronted to bring peace to those citizens near the northern border and elsewhere. It eventually resembled an Israeli "Vietnam."

Cauldron

The agony of Lebanon can largely be laid at the feet of the long-festering Arab-Israeli conflict. The flood of Moslem Palestinian refugees into the country upset the delicate ethnic balance that had been key to peaceful co-existence within the diverse society. Palestinian military operations from Lebanese soil brought the attention of the IDF that affected the entire country whose military was ineffectual. Zahal patrols and air reconnaissance across the border became routine. Raids by airborne troops, naval shelling, and fighter-bomber strikes were occasionally made on Palestinian targets in retaliation for, or to preempt, a terrorist attack. Collateral civilian casualties and property damage were common.

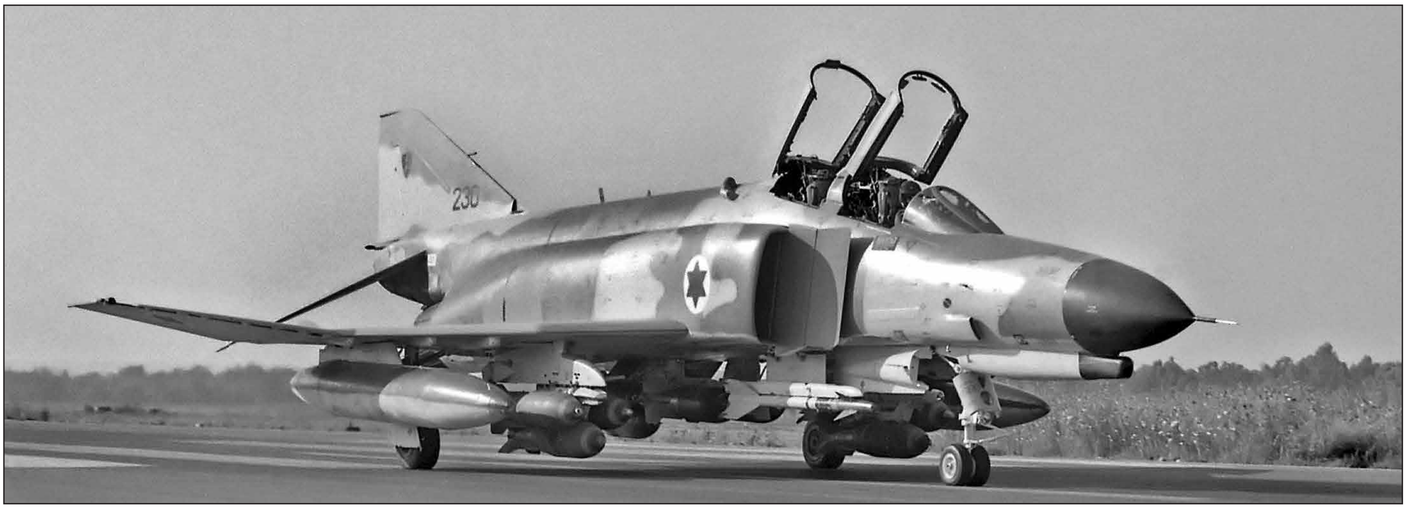
Civil war erupted between Moslem factions and Christian Phalangist militias in 1975. Over the years, the Syrians assisted first one then the other faction in order to prevent any one group gaining the upper hand and challenging Syria's influence in the country. Lebanon descended into a morass of sectarian hatred and bloodshed.

Repeated terror forays and hundreds of shelling incidents from Palestinian Liberation Organization (PLO) contingents in Lebanon was making life in northern Israel very tense. Zahal mounted innumerable small unit actions in southern Lebanon, with large-scale incursions across the border on May 12 and September 16-17, 1970. Following the murder of 11 Israeli athletes at the 1972 Munich Olympics, the IAF responded on September 9 with the heaviest airstrikes in Lebanon yet seen. The IDF then conducted the largest operation in southern Lebanon to that date with four days of combat begun on the 16th. Syria actively assisted much of the PLO military activities, greatly raising the level of violence during 1974 as a form of surrogate war-of-attrition. As many as 200 incidents per month were recorded at the peak, with IAF airstrikes sometimes heavy.

Purportedly to maintain the peace and counter a potential Israeli invasion of the country, Syria sent an armored division into Lebanon in 1976. The unit set down in the Beka'a Valley for a long stay. Actually seeking to dominate Lebanon and oppose Israel's geopolitical intrigue, the move added to the volatile mix. The Syrian presence was strategically disturbing to Israel as it offered an alternative route for attack in any bid to retake the Golan.

Another terrorist outrage claiming Israeli lives prompted another large-scale operation on March 14, 1978, to clear the PLO from an area extending about 15 miles (24 km) north of the border to the Litani River. Long in preparation, the operation was supported by airstrikes, 10,000 troops, and 200 tanks. It drove hundreds of fighters from the area and killed about 300. Over 1,000 civilians were also killed during the fighting that cost Israel 21 dead and 121 wounded. Zahal's progress was slow, with the operation taking a week. Israel was compelled by international pressure to cease the attack before achieving all of its objectives. The combat revealed several deficiencies in IDF planning and execution that were soon addressed. Its forces pulled back in June, but maintained a presence in a "security zone" beyond the frontier. Another smaller-scale incursion was executed during April 1980.

Thereafter, the IDF patrolled the security zone with the assistance of the South Lebanon Army (SLA), a Christian and Shiite militia group armed, trained, operationally supported, and politically sponsored by Israel. The SLA essentially became a state-within-a-state in the south of the country. The United Nations Interim Force in Lebanon was deployed in an attempt and keep the warring parties separated and to assist the government in reasserting its authority. However, United Nations (UN) personnel were unable to prevent the tit-for-tat violence on the border.



Into the 1990s, the F-4 remained the IAF's "sledgehammer" delivering heavy bomb loads on targets. With plentiful and superior interceptors, the Phantoms gave up most AAM carriage to maximize bomb payload. This heavily loaded 69 Squadron F-4E has an AIM-9 round on an Israeli launcher attached to the starboard forward Sparrow cavity. (Ra'anan Weiss Collection)

This OH-58B is seen at an assembly area during the Operation Litani invasion of southern Lebanon during March 1978. One role of the Bell was liaison, with delivery of senior IDF officers to forward areas, as likely occurred here with this 125 Squadron machine. (BIAF – Israel Aerospace Magazine)

The Egyptian-Israeli peace treaty was a signal for renewed Palestinian attacks, and Israel responded in kind. During the summer of 1979, the Syrian Arab Air Force began (SyAAF) challenging IAF reconnaissance flights over Lebanon and airstrikes on Palestinian targets. The Israeli government did not relish Syria complicating its military operations. The decision was made to draw a line for the Syrians and to test the IAF's new capabilities. A trap was laid for the enemy fliers. In June 1979, SyAAF jets challenged an IAF airstrike and lost five MiG-21s. This saw the first air-to-air combat for the IAF's new F-15s, Kfirs, and E-2Cs. The battle was the most serious aerial engagement since the post-1973 war tensions and it brought USA protestations. More battles over Lebanon followed with further one-sided outcomes. The F-15s and F-16s dominated with a mix of Python 3, AIM-9G, AIM-7F, and cannon.

The Israeli government was soon lending considerable active support for Christian militias to counterbalance the Palestinian forces. The assistance eventually extended to air action. This produced an undesirable side effect. On April 28, 1981, Israeli F-16s shot down two Syrian helicopters airlifting troops supporting an assault on a Christian enclave. The Israelis also bombed Syrian positions. Two days later, Damascus moved several SA-6 units into the Beka'a to provide cover for its troops. The tacit tolerance the Syrians and Israelis had observed for each other's position in Lebanon was at an end.

Israeli Prime Minister (PM) Menachem Begin demanded immediate removal of the missiles and termination of all SyAAF flights over Lebanon. The Syrians ignored the dictate. The IAF began reconnoitering the batteries with the usual camera ships and drones. From a strategic perspective, the SAMs could have covered a larger deployment of Syrian forces through Lebanon to threaten Israel. The IAF considered their presence an intolerable hazard to their routine air operations and were prepared on April 30 to destroy them. Strike airplanes stood ready, but the mission was delayed three times in four hours owing to inclement weather before being scrubbed for the day. Diplomatic intervention by the United States then caused indefinite postponement. The desire to take-out the batteries had to be weighed against the need to conceal SAM-suppression tactics for potential large-scale hostilities. There was also the possibility that the attack would complicate the planned mission to bomb the Osirak reactor. Bold reconnaissance of the Syrian deployments by the IAF brought occasional missile launches and the loss of several drones.

In July 1981, the lethal Palestinian-Israeli contest entered a new cycle with many rockets falling on northern Israel and bombs falling on targets in southern Lebanon. With 40,000 Galilee inhabitants fleeing the fighting, the Israeli government responded with expansion of the bombing campaign. On the 17th, the IAF bombed the PLO headquarters in Beirut, resulting in more than 300 fatalities and over 800 injured. In response, the USA extended the shipment suspension of 21 F-16s that had followed the Osirak raid. As the violence escalated, the Syrians moved additional anti-aircraft missiles across the border. Strenuous diplomatic efforts allowed all sides to stand down with a July 25 ceasefire, but this was clearly a temporary respite.

Let Loose

By spring 1982, tensions had again risen to the point that war appeared imminent. Heavy airstrikes on PLO infrastructure near Beirut came on April 21. Nevertheless, there seemed no stopping the repeated shelling and rocketing of northern Israel by the Palestinian guerillas despite frequent airstrikes and commando raids. Thousands of residents of northern Israeli towns were fleeing to the south to escape the intolerable threat. By this time, the PLO had grown to a real military force with enormous stockpiles of modern weapons and training as actual battlefield formations. Israeli airstrikes still occasionally hit Syrian elements threatening Christian positions. Syrian missile batteries occasionally fired on IAF reconnaissance flights. Zahal was clearly gathering itself for another invasion or, at the very least, an attack on the SAMs. The IAF spent a year planning, training and equipping for the blow against the missiles, including rehearsal against mock batteries. All IDF assets were put at the disposal of the planners to ensure success. When the big battle came, the Israelis enjoyed a clear superiority in nearly every aspect of systems and tactics.

Prime Minister Menachem Begin warmly congratulates Major-General David Ivry at a reception following the successful strike on the Iraqi nuclear reactor. (Ofer Zidon Collection)

9th Commander – David Ivry took over as IAF commander in October 1977, amongst the tumultuous transitions following the Yom Kippur War. He had begun his career with induction during 1952 and pilot training. His early years were spent flying Spitfires and Mustangs. Transitioning to jets saw him piloting Ouragans while instructing at the Flying School. He flew Ouragans during the Sinai Campaign. Returning to squadron duties, Ivry eventually becoming deputy commander in a Mystère IVA squadron before helping see in the Super Mystère. Then came another Deputy Commanding Officer (CO) post in 101 Squadron as it introduced the Mirage IIICJ. In 1963, he returned to the Mystère IVA as squadron commander and a year later a Mirage unit. In 1966, Ivry took command of the Flying School and oversaw its move to Hatzerim AB. He flew Mirages with 101 during the Six-Day War, but returned to Hatzerim near the end of fighting to lead 147 Squadron after its CO had been killed. Following the war, Ivry took senior postings in the Air Force Headquarters (AHQ) Operations branch. In 1970, he became commander of the Tel Nof Wing and in 1973 returned to the AHQ as head of the Air Department. After two years earning an aeronautical engineering degree, Ivry was appoint as IAF's commander and oversaw the Air Force's pullout from Sinai, establishment of new Negev bases, the attack on the Iraqi reactor, and the fighting in Lebanon. He went on to serve as the IDF Deputy Chief-of-General-Staff then many civilian posts in the MoD and industry.

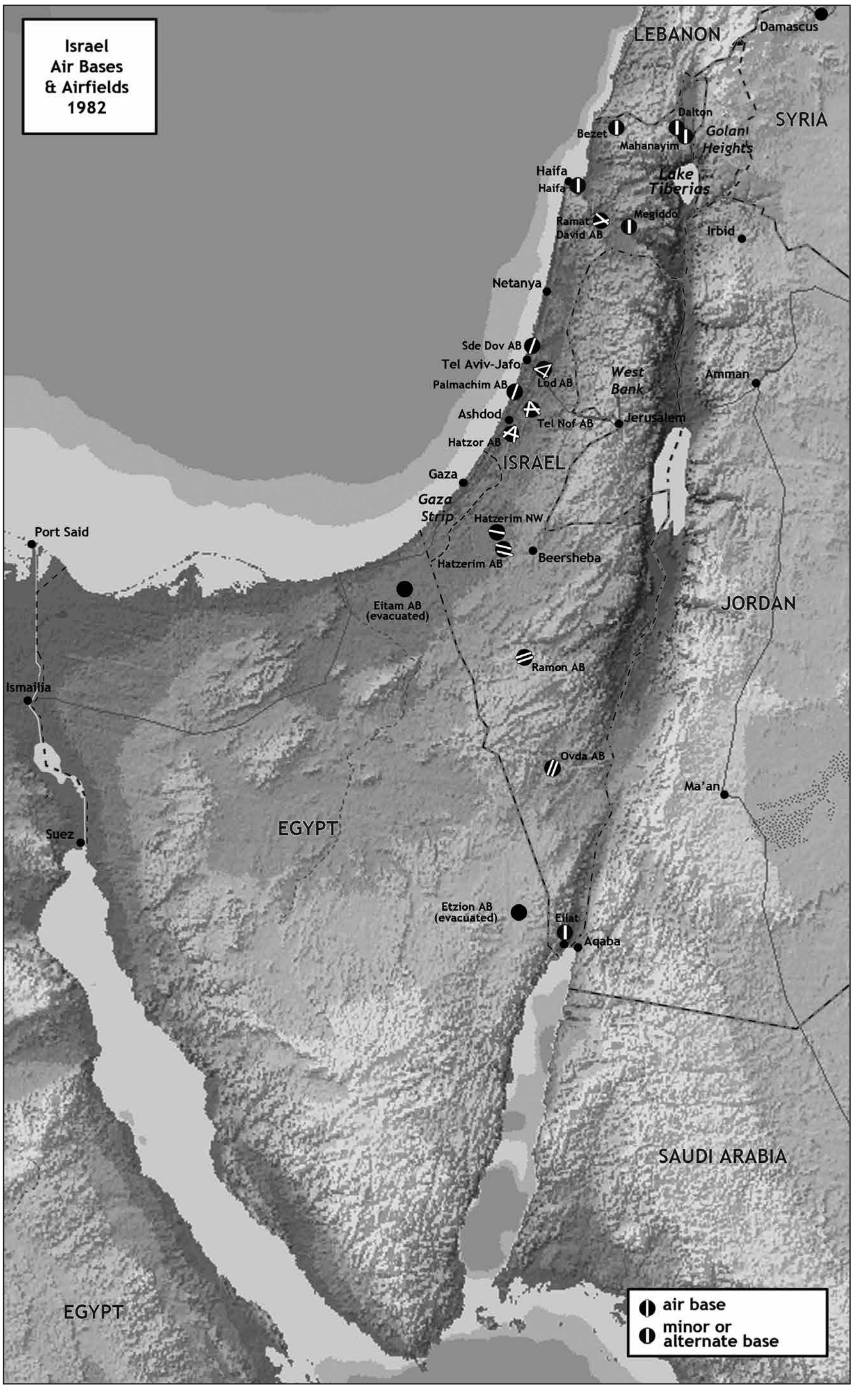
The *casus belli* triggering the long-anticipated invasion of southern Lebanon was the June 3, 1982, shooting of Israel's ambassador to Great Britain by Palestinian terrorists. The glove went down the following day with some 60 IAF airstrikes, including afternoon missions against a PLO training camp and an arms cache under the Beirut soccer stadium. The Palestinians responded with intense rocket and artillery fire into northern Israel that continued into the 5th, to which Israel responded with further bombing. Operation Peace for Galilee began on June 6 when a force of 76,000 troops, 1,250 tanks and 1,500 APCs began crossing the border. They faced 15,000 regular and 18,000 militia Palestinian fighters and the Syrian mission of 22,000 troops with some 350 tanks. The IAF went to war with the following ORBAT (some data best estimates) [10]:

Fighter-Bomber
35 F-15 including 18 A, 2 B, 9 C, 6 D (5 u/s)
71 F-16 including 62 A, 8 B (14 u/s)
123 F-4E (38 u/s, some possibly stored)
181 A-4N some via upgrade of earlier models (54 u/s some stored)
95 Kfir C2 (24 u/s)
25 Kfir (baseline model with strakes)
19 Shahak (8 u/s) modernized Mirage IIICJ, retired in the second week of the war
Attack Helicopter
11 AH-1 (5 G, 6 S, 7 u/s)
29 500MD (7 u/s)
Electronic Warfare
8 Boeing 707 (including 4 ELINT, 2 COMINT, 2 C^3/EW)
2 EC-130H conversion
(2) CH-53 ELINT
4 E-2C AEW
Maritime Patrol
3 Sea Scan
Reconnaissance/Surveillance
11 RF-4E
3 F-4E(S)
2 Shahak modified for camera noses
13 Firebee RPV
12 Chukar RPV (modified for camera installation)
? Scout RPV (a few for evaluation)
? Mastiff RPV (a few for evaluation)
Aerial Refueling
2 KC-130H hose-drogue
-- a few A-4 buddy refueling pods
Transport
6 Boeing 707
19 C-130E/H
1 Westwind
15 C-47
12 Queen Air
23 Do.28
8 Do.27
33 U206
2 C-180
(3) Arava (IAI assets leased for the emergency)
Transport Helicopter
20 S-65/CH-53
12 Super Frelon (10 re-engined)
55 Bell 212
21 Bell 206, OH-58
2 Alouette II
Training
90 Magister (some possibly stored)
31 TA-4
2 Kfir TC2 combat-capable
2 Mirage IIIBJ combat-capable
5 Nesher T combat-capable (2 u/s)
25 Super Cub
12 Bell 206
Ballistic Missile
50-100 Jericho
1,045 total aircraft

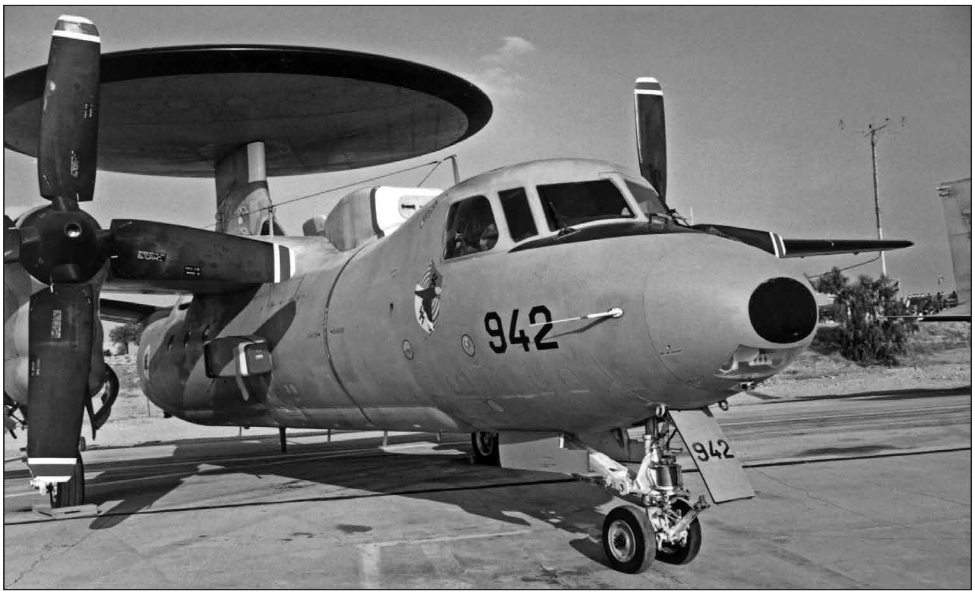
Hatzerim (Wing 6)	
102 Flying Tiger	A-4N
107 Knights of the Orange Tail	F-4E
123 Southern Bells	Bell 212 (also operated from Haifa)
147 Goring Ram	A-4E/F/N
192 Hawkeye	E-2C
Flying School	Cub, Magister, Bell 206
Advanced Training Squadron	TA-4
Hatzor (Wing 4)	
101 First Fighter	Kfir C2
105 Scorpion	F-4E
113 Hornet	Kfir C2
201 One	F-4E
254 Midland	Kfir and Shahak (shadow squadron)
Lod (Wing 27)	
120 International	Boeing 707, Westwind Maritime Surveillance Flight – Sea Scan
122 Dakota	C-47, Arava
103/131 Yellow Bird	C-130 joint squadron operating a pool of aircraft
Ovda (Wing 10)	
144 Guards of the Arava	Kfir C2, operated from a northern base for duration of war
149 Smashing Parrot	Kfir C2
Palmachim (Wing 30)	
124 Rotor and Sword	Bell 212 detachments at northern bases, including Haifa
160 Southern Cobra	AH-1, 500MD, detachments at northern bases[11]
161 Northern Cobra	500MD, detachments at northern bases
200 UAV	Firebee, Chukar, Mastiff, Scout
Ramat David (Wing 1)	
69 The Hammers	F-4E, RF-4E
109 Valley	Kfir C2
110 Knights of the North	F-16A/B
117 First Jets	F-16A/B
Ramon (Wing 25)	
140 Golden Eagle	A-4N
253 Negev	F-16A/B
Sde Dov (Wing 15)	
100 Flying Camel	Do.27, Do.28
125 Light Helicopters	Bell 206, OH-58, Alouette
135 Light Transport	Queen Air, U206, C-180
Sdot Micha (Wing 2)	
150 (unverified)	Jericho
Tel Nof (Wing 8)	
114 Heavy Lift	Frelon, CH-53
115 Flying Dragon	A-4N
116 Flying Wing	A-4N
118 Night Birds of Prey	S-65/CH-53
119 Bat	F-4E, RF-4E, F-4E(S)
133 Twin Tail	F-15A/B/C/D
669 Aeromedical Evacuation Unit	on-call Bell 212, CH-53, C-130

The IDF advance was swift, isolating and bypassing pockets of resistance. Air attacks, air assaults by Sikorsky-borne troops, and amphibious landings sought to slow the PLO withdrawal north so that these forces could be encircled and destroyed. While efforts were made to avoid civilian casualties and collateral damage, these were inevitable. The IAF did fly leaflet drops to warn the populace of attacks. Zahal avoided engaging the Syrians, and the government had passed word that the operation was not aimed at them. However, there were many "hawks" in the Knesset (parliament) and Kiryah (military headquarters) who were eager to give the Syrians a "bloody nose" and force the withdrawal of its forces.

The IDF deployed into the Syrian sector and placed the forces there at a military disadvantage. From the Syrian perspective this was decidedly threatening and elements of the two armies clashed. Ground penetrations of the Beka'a resulted in


Israel
Air Bases
& Airfields
1982
LEBANON
Damascus
SYRIA
Dalton
Bezet
Mahanayim
Golani Heights
Haifa
Haifa
Lake Tiberias
Ramat David AB
Megiddo
Irbid
Netanya
Sde Dov AB
Tel Aviv-Jafo
Palmachim AB
Lod AB
West Bank
Amman
Ashdod
Tel Nof AB
Jerusalem
Hatzor AB
ISRAEL
Gaza
Gaza Strip
Hatzerim NW
Port Said
Beersheba
Hatzerim AB
Eitam AB (evacuated)
JORDAN
Ramon AB
Ismailia
Ovda AB
Ma'an
Suez
EGYPT
Etzion AB (evacuated)
Eilat
Aqaba
SAUDI ARABIA
EGYPT
◐ air base
◐ minor or alternate base

In April 1982 the Israelis had completed its evacuation of Sinai and begun fully establishing its presence in new Negev bases. Much of its combat strength was still in the center and north of the country, although the new combat aircraft (save for helicopters) made distance to the Lebanon battlefield of lesser importance than in the past. (Tom Cooper)

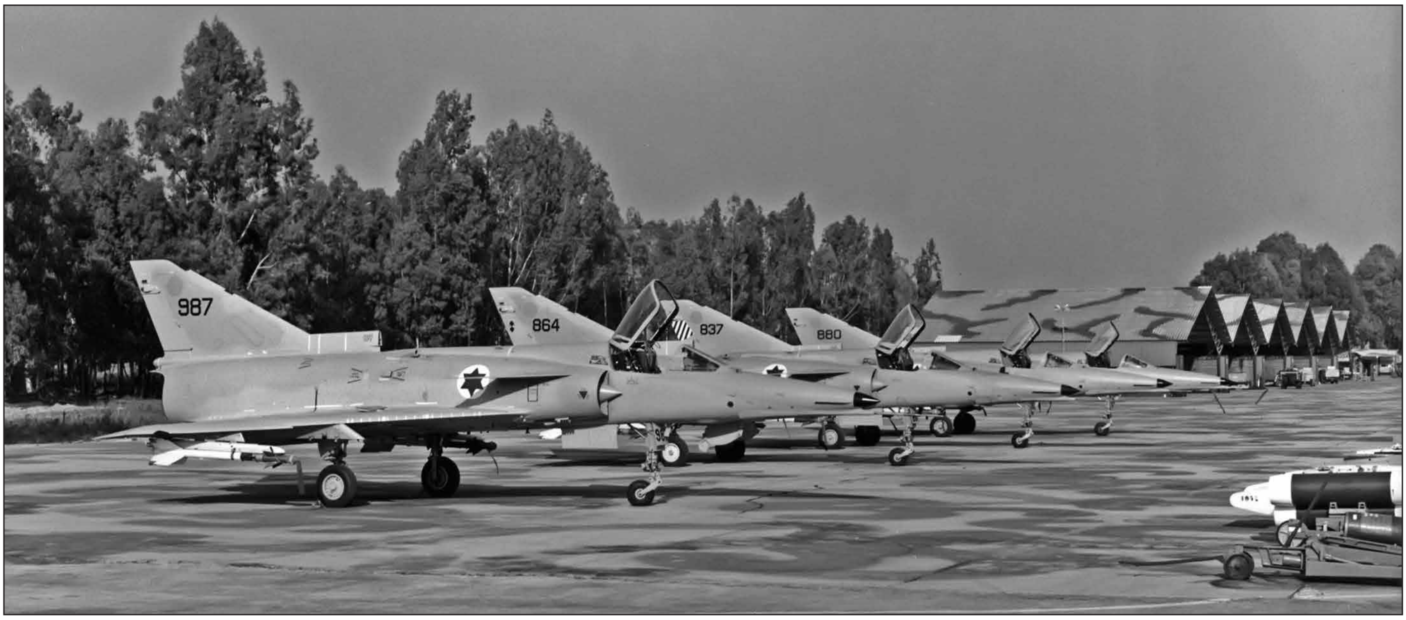


The E-2C was taken up in the late 1970s to provide early warning of adversary aircraft movement and to optimally direct Israeli assets in response, especially with return of the Sinai to Egypt. Its greatest contribution was during Operation Peace for Galilee, and the four aircraft served until 1994. The aircraft shows the badge of 192 Squadron. (Author's Collection)

major armored battles beginning on the 9th. The mountainous terrain and developed areas hampered the IAF support for the campaign against the Syrians, and some fratricide was also experienced. Bell 212s and Sikorskys transported anti-tank teams to advantageous positions. The clash saw the first combat use of the IAF's young attack helicopter teams in the anti-armor role, though in a very different setting from which they had trained. The terrain, with treacherous wind currents, meant only the Cobras had the excess power to participate, and only after downloading their rocket pods. The enemy dispositions were unclear and so the crews had to seek and destroy in pairs on their own without closely coordinating with ground elements. They may have destroyed 30 tanks and other vehicles. Although mauled, the Syrian forces disengaged and fell back in good order.

As in previous large-scale IAF missions over southern Lebanon in the past few years, the SyAAF made a show of challenging reconnaissance (recce) and bombing sorties. A MiG-23 was shot down on the 7th and six more jets the following day. The Syrians then moved an additional half-dozen SA-6 batteries into the Beka'a and the Zabadani mountain range above, bringing the total SAM batteries to perhaps 19 with 15 SA-6, two SA-3, and two SA-2 with 200 missiles for reload. Other elements of the integrated air defense system included ZSU-23-4 and 23-mm radar-controlled guns, 37-mm and 57-mm AAA, and shoulder-fired SA-7s. This created an anti-aircraft barrier of unparalleled density. The PLO and hostile militias also possessed SA-7s plus various forms of AAA such as truck-mounted 20-mm.

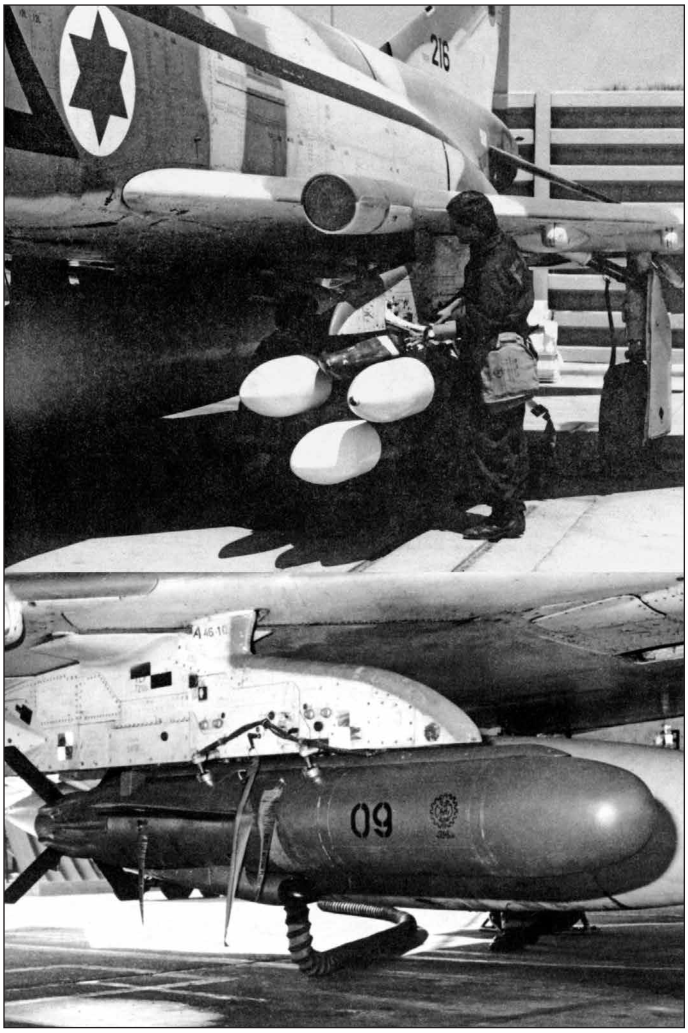
The IAF saw the Syrian air defenses in Lebanon as too great a hazard to their combat operations and felt that they needed to establish undisputed air superiority over the combat zone. Drones helped fix the location of each radar and launcher. Signals data on the radar emissions were collected to identify each threat and then optimize ground-based and airborne jamming. These probing activities also had the effect of wearing down the defense crews and equipment that remained on tense alert for several days. The IAF fully exploited Syrian tactical errors as they failed to frequently relocate their assets, including the mobile SA-6s and ZSU-23s. The Syrians made little effort at camouflage or deployment of dummies. They also did not have many protective bunkers for their personnel and reserve missiles. Operators displayed poor emissions discipline. Many more radars were operated simultaneously than required and



The Kfir proved disappointing in air-to-air maneuverability and so IAI introduced changes. Those are evident with these Kfir C2s in the canards protruding from the inlets, the strakes on the noses, and the "sawtooth" on the wing leading edge. These aircraft, from 101 and 113 Squadrons at Hatzor AB, carry Sidewinder AAM. (BIAF – Israel Aerospace Magazine) sometimes the tracking unit was turned on before a target was in range.

The very first mission for the Defenders was to destroy a radar station operated by the PLO – a mission commonly performed by fighter-bombers, but the helicopters could "sneak in" without alerting the Syrians that the anticipated big operation was beginning.[12] The action helped conceal the aircraft approaching from one quarter.

The SAM batteries were struck on June 9. The four-wave attack, involving some 90 aircraft, employed classical deception and suppression features. The first phase began when Samson decoys were launched from A-4s and F-4s to give the impression that armed aircraft were inbound. Firebees may also have performed this role or been employed to establish the latest position of mobile SAMs. Chukars were also flown and may have dispensed chaff in addition to performing jamming. These measures enticed the Syrians to activate their radar network and it quickly became saturated with targets. They began firing off most of their ready missiles, including volleys at individual targets, even after shutting down the guiding radar to avoid being struck by ARM. After the missiles were away, some radar continued to radiate, making themselves vulnerable to attack with ARM from Phantoms and Skyhawks. Modified Boeing 707s provided selective jamming of communications and radar systems while A-4s employed centerline jammer pods. Jamming not only rendered some radar ineffective, clearing corridors of attack, but also served to deceive the operators with phantom attackers. Reacting to all real and perceived threats quickly overwhelmed the network. Coordination of the Israeli electronic battle was critical to avoid self-jamming in the small combat area, but was performed well.



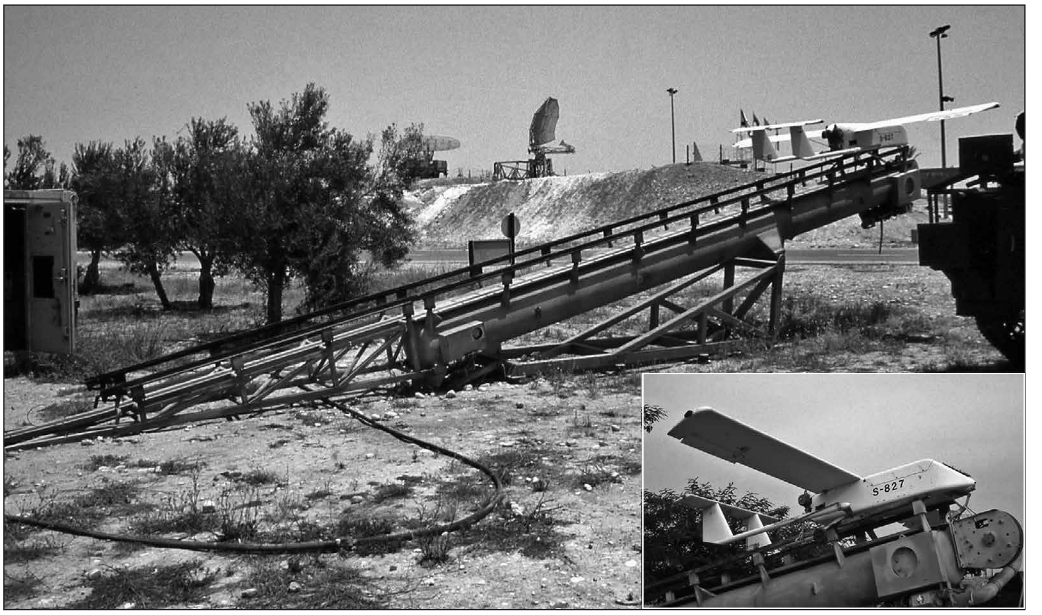
Working with American manufacturers, the Israelis developed their own family of air-launched decoys to spoof air defense radars and help protect a strike force. The Samson (top, mounted on a 105 Squadron F-4E), would glide into the strike area and give the radar reflection of an attack aircraft. The Delilah (bottom, also on a Phantom) had a small turbine engine for extended loiter. The Samson assisted in the IAF success against the Syrian air defenses in Lebanon. (Author's Collection)

The Syrians dispensed a smoke screen in an attempt to hide their resources from attack aircraft. However, this was ineffectual and only helped to guide the fighters to their targets. Flying at low-level from multiple directions simultaneously, strike aircraft initially took advantage of terrain masking provided by the Lebanese mountains until just prior to entering the target area. The aircraft made extensive use of chaff and flares. Ground-launched rockets also delivered chaff over the battle area. It has been stated that the strike aircraft did not fly at the exceptionally low altitudes seen at the beginning of the Yom Kippur War (as low as 500 feet/152 m), but were probably at several thousand feet. This allowed the use of aircraft formations that then split into pairs for ingress into the target area. Only a single pass on the target per aircraft was made. The first wave consisted of 24 Phantoms and F-16s firing Maverick, improved Shrike, and possibly Standard missiles from about 7,000 feet (2,134 m) against radar and command nodes from 22-mile (35-km) range. Ground-based delivery systems (boosted ARM, artillery rockets, self-propelled artillery) also played a significant role hitting other targets. This fire was adjusted using images transmitted from RPVs orbiting over the area. The images also provided real-time damage assessment so airplanes could be retasked in-flight as necessary for optimal efficiency.

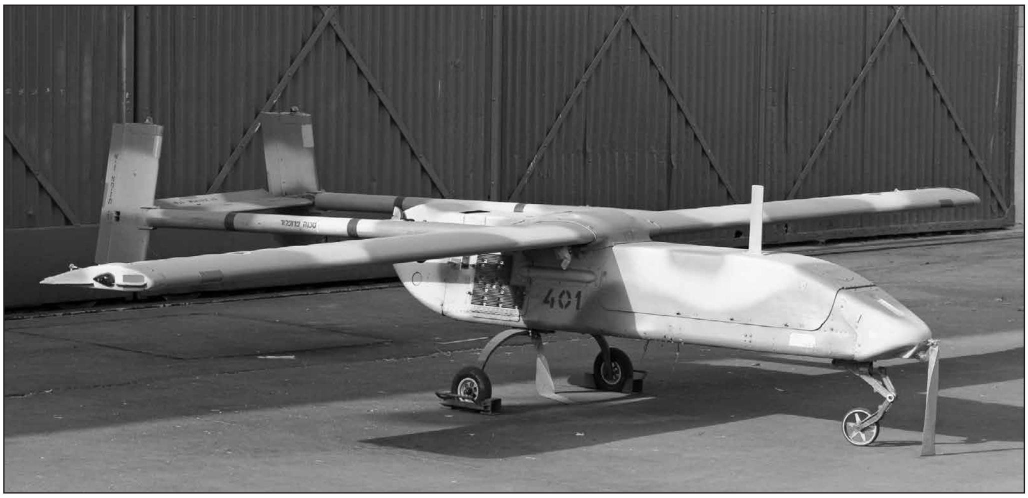
The second wave involved A-4s and Kfirs flying random low-altitude patterns and delivering optically guided stand-off munitions, cluster bombs, and general-purpose bombs onto the missile launchers and other soft support elements. The IAF has maintained that very few PGMs were used because of their expense and the more precise attack conditions they required, exposing the manned aircraft to threats for a longer period. Any SAMs that were launched were diverted with chaff, flares, or other countermeasures. The third wave was devoted to finishing off remaining missiles and other Syrian installations using unguided iron bombs and cluster munitions. The final wave performed general mopping-up.

In about 60 minutes, the IAF destroyed 14 SAM batteries with no Israeli aircraft lost. This impressive success can be attributed to sound training and careful planning, superior C^2 using an effective battle management system, equipment optimized to a narrow set of threats, a good degree of tactical flexibility, and exploitation of enemy tactical errors.

The Syrians responded by sending some 60 MiG-21s and MiG-23s to challenge the IAF armada and replace the air defense so suddenly eliminated. This reaction was readily apparent to the Israelis as they monitored radio traffic intercepts plus aircraft movement via ground and airborne radar from the moment they left their runways. The rules of engagement (ROE) were that any SyAAF aircraft that crossed beyond the range of SAMs within



In answering the intelligence collection problem revealed by the Yom Kippur War, the radio-controlled airplane solution was evaluated with development of miniature remotely piloted vehicles. The Mastiff III was one outcome of this effort, the RPV typically launched from the catapult shown and remotely operated from the ground station shelter seen at left. The Mastiff was operated primarily by Army Intelligence and contributed during Operation Peace for Galilee despite still being in test. (Author)



The Scout was the other system developed in the period after the Yom Kippur War and the one ultimately adopted by the IAF. Like the Mastiff, it had telephoto lenses for daylight and infrared video imaging downlink. The tiny aircraft could be launched from a catapult and recovered into a net, but was most routinely operated from paved surfaces, snagging an arresting wire on landing. The Scout served with 200 Squadron for more than a decade. (Ofer Zidon Collection)

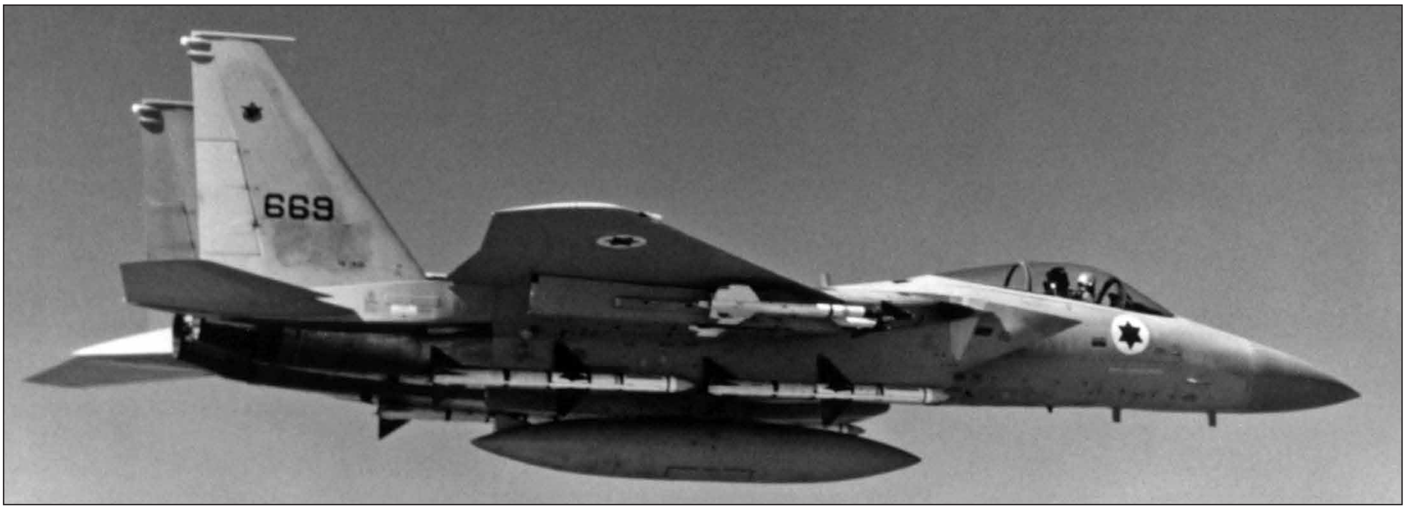
Syrian territory would be engaged. Once it became clear that the fighters were seeking battle, their communications and ground control intercept radar frequencies were jammed, leaving the pilots without the means to coordinate their attack. Other electronic measures deceived the Syrian controllers into vectoring fighters into "killing zones." In other instances, IAF aircraft served as bait to lure enemy aircraft into an area where they could be engaged by Israeli warplanes masked from enemy visual and radar detection. The SyAAF formations quickly lost cohesion and discipline. Efforts to jam the IAF frequencies were largely ineffectual as the Israelis had deployed a digital frequency-hopping VHF radio.

As many as 90 IAF fighters met enemy aircraft in the largest air battle since the Second World War. With the SAM suppression operation underway and fighting overhead, the airspace was dense with more than 200 aircraft. Sequencing of flights and shifting of resources by the IAF ground and airborne controllers became critical. The F-15s worked the high-altitude regime, around 30,000 feet (9,144 m), employing their look-down radar. The F-16s operated at lower altitudes where they could detect targets against the open sky with their less capable radar. Two Hawkeyes orbited off the coast, protected by a pair of F-15s. As soon as the Syrians were engaged, they usually turned for the border, generally requiring only a minute before they crossed to safety. Again, the mountains provided cover from detection, allowing some Israeli fighters to jump the SyAAF machines with little warning and from advantageous bearings. Not only were the Syrians at a numerical disadvantage, and employing inferior aircraft and weapons, but they failed to properly exploit what advantages they did possess.

The engagements were usually conducted at close quarters rather than beyond-visual-range (BVR), largely dictated by the confined combat area (15 to 30 miles/24 to 48 km deep) and the vast number of aircraft mixing it up possibly mandating visual identification. When the skies cleared on June 9 the Israelis claimed 22 MiG-21 and MiG-23 plus a Gazelle anti-tank helicopter knocked down, and seven more aircraft damaged.

On the night of June 9/10, the Syrians moved additional SAM fire units and stand-by missiles into the Beka'a, but these were all destroyed by the IAF the next day. This and other support sorties on the 10th again brought forth the SyAAF, and they received similar treatment as on the previous day. The IAF counted 32 enemy jets and three rotorcraft destroyed. The Syrians challenged the Israelis again on the 11th when the IDF seemed intent on cutting their highway link to Beirut. Another 23 SyAAF aircraft fell before a ceasefire between these combatants was called.

The Syrian and Israeli forces disengaged, fortunately without sparking a general war. However, the confrontation and occasional bombing continued. When Damascus sent additional SAM



Acquisition of the outstanding but costly F-15A as the first foreign operator, and as it was initially being introduced to American forces, was a real coup for Israel. Yet, it marked a departure from past doctrine of employing multi-role combat aircraft given that the Eagle was essentially a pure air superiority fighter. The 133 Squadron (early markings shown) found much work during the 1982 war in Lebanon. (Jay Miller Collection)

batteries into Lebanon, the IAF destroyed them in nine strikes through October. These included SA-8 and SA-9 units, some manned by Soviet personnel.

The IDF battles with the Palestinians continued. By June 13, the army had encircled Beirut, having gone far beyond the originally stated extent of war. The Israelis were not interested in entering the city and suffering the casualties common with urban fighting. A leaflet drop on Muslim West Beirut heralded a blockade of the city that included cutting off the water supply, initiated on July 3. The siege included sometimes heavy shelling and bombing of West Beirut with heavy loss of life and property damage. Multiple ceasefires were established and broken. These actions brought great international pressure on Israel because of the destruction and civilian casualties, including a warning from the USA that it might reassess its relationship with Israel if the bombing was not halted. The attacks slackened.

On August 1, the PLO agreed to evacuate of their forces from the city, monitored by a Multi-National Force (MNF), provided the IDF did not occupy West Beirut. Removal of about 10,000 Palestinian combatants between August 21 and 30th under the protection of peacekeepers was completed without serious incident. The MNF withdrew and, with recently appointed Lebanese President Bashir Gemayel having initialed the outline of a peace treaty with Israel, it looked like the Israelis had achieved all they could have wished. However, Gemayel was assassinated on September 14. Israeli forces then occupied the whole of Beirut. Although Zahal's stated intent was the prevention of violence, their surrogates, the Christian Phalangists, entered the Sabra and Shatilla refugee camps and murdered hundreds of unarmed and unprotected Palestinian civilians. The MNF returned to Beirut to help separate the warring parties.

The F-15s were bought in part to answer the intrusion of MiG-25 reconnaissance flights over Israel. As soon as the McDonnell Douglas aircraft began operating in Israel, the overflights ceased. However, flights over the Israeli operations in Lebanon were executed at Mach 2.5 and 70,000 feet (21,336 m) by the MiG-25R, just beyond the reach of Improved Hawks. An opportunity arose in February 1981 when a pair of MiG-25s attempted to disrupt a recce mission. An F-15 fired an AIM-7F in a snap-up zoom climb to hit the high-speed/high-flying jet. Another was downed in July. Later, a Hawk technician devised a way to fire the SAM in a manner that allowed it to barely touch the MiG. The air defense team's opportunity presented itself on August 31, 1982, with two SAMs managing to damage the speeding Foxbat that then descended into range of the AIM-7F, one that was successfully launched by a 106 Squadron F-15C.

The new F-16 fleet contributed to ground attack as well as intercept during the height of the combat over Lebanon. These are 140 Squadron F-16As, that unit operating at Ramon AB from 1986, are armed with AIM-9 missiles and show the flare/chaff dispenser grafted to the vertical tail island. (Author's Collection)

Relative Effectiveness

About 1,000 Palestinian fighters had been killed and thousands more evacuated, with much of the PLO's equipment and infrastructure destroyed. Syrian forces also lost up to 1,000 men killed. These results had come at the cost of 462 Israeli soldier deaths and 2,218 wounded with perhaps 300 tanks and APCs knocked out. The apparent successes of the IDF operation did not translate into clear victory. Overall, some 18,000 persons were killed and 30,000 injured in the war, most being civilians. These casualties, and particularly the massacres, combined with what many outsiders and even Israelis saw as an operation of unnecessary severity, duration, and extent, resulting in more occupied land, brought tremendous pressure on the Israeli government and questions regarding the military's actions. Zahal was perceived, at home and abroad, as embarking on a geopolitical adventure of power-projection with reckless military operations endangering innocent civilians. The use of American-supplied cluster bombs in built-up areas was particularly vilified. This brought the unusual spectacles of anti-war demonstrations at home and a highly decorated IDF commander resigning in protest. Some pilots refused orders to hit targets that appeared to endanger civilians, instead dumping their ordnance into the sea. The damage to Israel's image internationally was great. Defense Minister Ariel Sharon was compelled to resign over his failures leading to the Sabra and Shatilla crimes.

Operation Peace for Galilee was not a severe test for the IAF because of the limited nature of the combat and Israeli control of the battles, but there was much for which to be pleased. The Air Force flew some 1,200-2,000 sorties during the first weeks of the war, with an average 100-200 per day and as many as 400 at its peak. Through August 12, there were 6,327 sorties of which 3,445 were combat. The transport and helicopter units contributed 3,922 on a different timescale. The IAF performed quick turn-around of most aircraft, as little as 10 minutes in some cases, owing to pressure refueling capabilities and rapid means of preparing mission materials for aircrew.

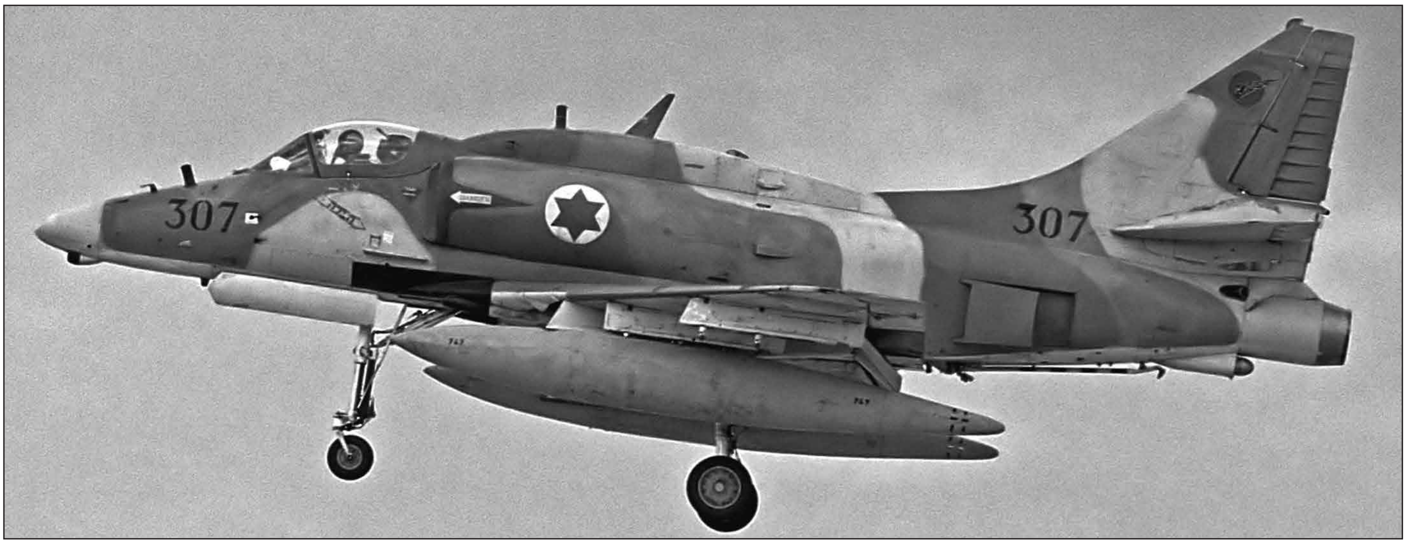
The IDF's hard work to answer the SAM threat appeared validated. The operation was against a force much smaller and confined force than that faced in 1973 and so the ability to suppress a similar or greater threat remained analytical. Yet, the success brought as much attention from airpower teams worldwide as the preemptive strike of the Six-Day War. Its aircraft and ground-based defenses claimed 98 SyAAF aircraft felled in seven days – though this was viewed as largely a "turkey shoot" by a far superior force. However, these satisfying results were also examples of the mission-creep that pervaded the entire war in that they played no part in achieving the principal goals of the operation.

Israeli attrition throughout the first month or so of combat is believed to have including an F-4, an A-4, a Kfir, two AH-1s, perhaps one or two 500MDs (one damaged by friendly fire), and two Bell 212s. The RPV force lost two Firebees, a Mastiff, and eight Scouts. Credible sources claim that none of these fell to enemy fighters. The IAF recorded 47 aircraft hit through June 27, but 37 were back in service during that period. Some eight to 12 IAF aircraft were severely damaged – as many as 16 according to some accounts. Lost in operational accidents were an F-16, a Kfir, a 212, and a Mastiff. Eight aircrew were killed and two became POW. There is dispute over such figures.

The AAM use increased again, with cannon accounting for only 8 percent of the kills. The AIM-9L was especially effective as it allowed a shot from any aspect while the Syrian missiles could only be fired effectively from the rear.

Although some problems persisted, Lebanon saw a return to the effective air support the IAF had provided ground forces in

During the first day of the 1982 war in Lebanon, a Bell 212 of the Aeromedical Evacuation Unit 669 was hastening to the site of a downed A-4 and near the amphibious landing at Sidon. The helicopter was shot down by an SA-7 with the loss of all five servicemen aboard, including the doctor. The Skyhawk pilot fell into the hands of the PLO. The IAF had ceased applying special markings to their medivac choppers because they still drew fire. Because of this, even the doctors aboard AEU aircraft carried personal weapons.



The A-4N became the basis for the rest of the Skyhawk fleet, many modified with similar features. This 116 Squadron N has the 30-mm cannon, RWR antennas, drag chute housing, squared vertical tail tip, and spine "hump" for added avionics. Following the Yom Kippur War, the Israelis introduced the exhaust extension barrel. Unseen are the additional flare/chaff dispensers within the bottom of the aft fuselage. (IDF Spokesperson via Ofer Zidon)

1967. A sound system for coordinating and responding to requests allowed missions to be briefed quickly or flights re-tasked while airborne. Its Air Defense Forces element moved forward with the troops. The RPV operations provided invaluable rapid-response battlefield intelligence to IDF troops and quick damage assessment. All of this was backed by an EW capability closely matched to the needs of the battlefield. The IDF had come a long way toward realizing the combined-arms objectives it had worked on since 1973.

Air support to the ground forces was mainly the domain of Skyhawks and Kfirs, though flown at medium-altitude to avoid AAA threats.[13] However, attack helicopters spent most of their time performing some manner of closer CAS and interdiction rather than anti-tank missions from stand-off distances over open terrain. The service reported 99 hits for 137 TOWs fired.[14] Their night fighting ability was still marginal as TOW at that time had limited capability in the dark and the teams had not trained extensively with NVG. Coordination with FACs had also not been much performed. Consequently, the chopper crews went looking for their own work and found some trouble in the bargain. Ground fire had the consequences presented above, some via friendlies. One Cobra pilot was killed and his corpse dragged through the streets of Beirut.

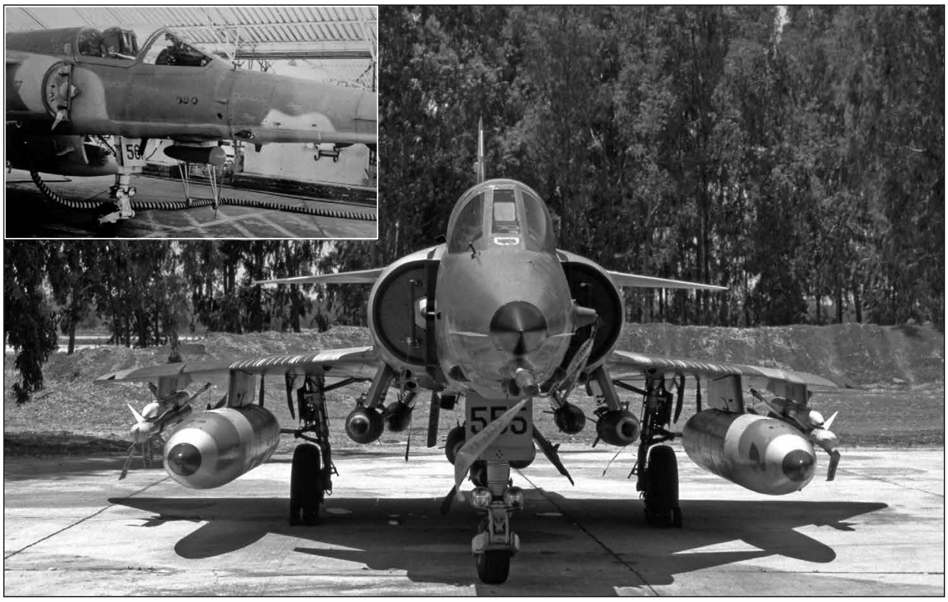
The Bells and CH-53s performed a good deal of casualty evacuation (casevac). Over 82 percent of the evacuations (2,518 personnel) were made in a one-hour flight directly to Israel. Urgent replenishment of forward Zahal elements were by troop helicopters and light aircraft. Three mobilized IAI Aravas proved valuable in that they could operate off roads in short distances. At least three airheads were created during the march north to include a disused airfield, a stretch of highway, and another on ground of suitable bearing strength for the C-130s and C-47s.

The war provided a fortuitous operational test of the mini-RPVs. Their primary roles were battlefield surveillance, artillery spotting, and tactical reconnaissance. Even the Defense Minister is said to have had real-time RPV imagery available in his office. All these missions, some in very hazardous environments, reduced the use of manned reconnaissance aircraft to those truly needing their high-resolution photographic systems. At the peak of the battles, RPVs were in the air almost continuously, flying as many as 70 sorties per day. The IAF claims they logged some 1,000 sorties during 1982 in support of the extended IDF mission in Lebanon.

Sideshow

Operation Peace for Galilee had no clear terminus and the war did not end the terrorist threat to Israel. Lebanon remained a haven for Palestinian military activities. Rockets continued falling in Galilee. The deployed Israeli forces continued counter-terror operations beyond 1982. The mission proved costly and unpopular, though expanded use of PGMs by the IAF sought to reduce collateral damage and casualties. Palestinian and Shi'a Muslim guerrillas met the continued occupation of Lebanon with attacks on Zahal personnel. The IDF initiated a limited pullback to the Awali River (about 40 miles/64 km north of the border) in 1983, but attacks continued. Israel responded with severe actions against guerrilla initiatives and, consequently, the local populace under their "Iron Fist" policy during 1983 to 1985. This also failed to deter the enemy. Destroyed equipment was quickly replaced using funds from abroad and personnel replaced with fresh crops of disillusioned youth. The harm to the Palestinian community was no worse than that perpetrated by other adversaries. Guerrilla attacks continued to rise, yet the occupation drew stronger opposition at home.

This 131 Squadron C-130E performs airdrop of logistics pallets as was done during Operation Peace for Galilee. The aircraft had added antennas and other fuselage protrusions associated with electronic warfare introduced in the 2000s. This suggests the aircraft could host roll-on EW pallets with gear and operators. (Ofer Zidon Collection)



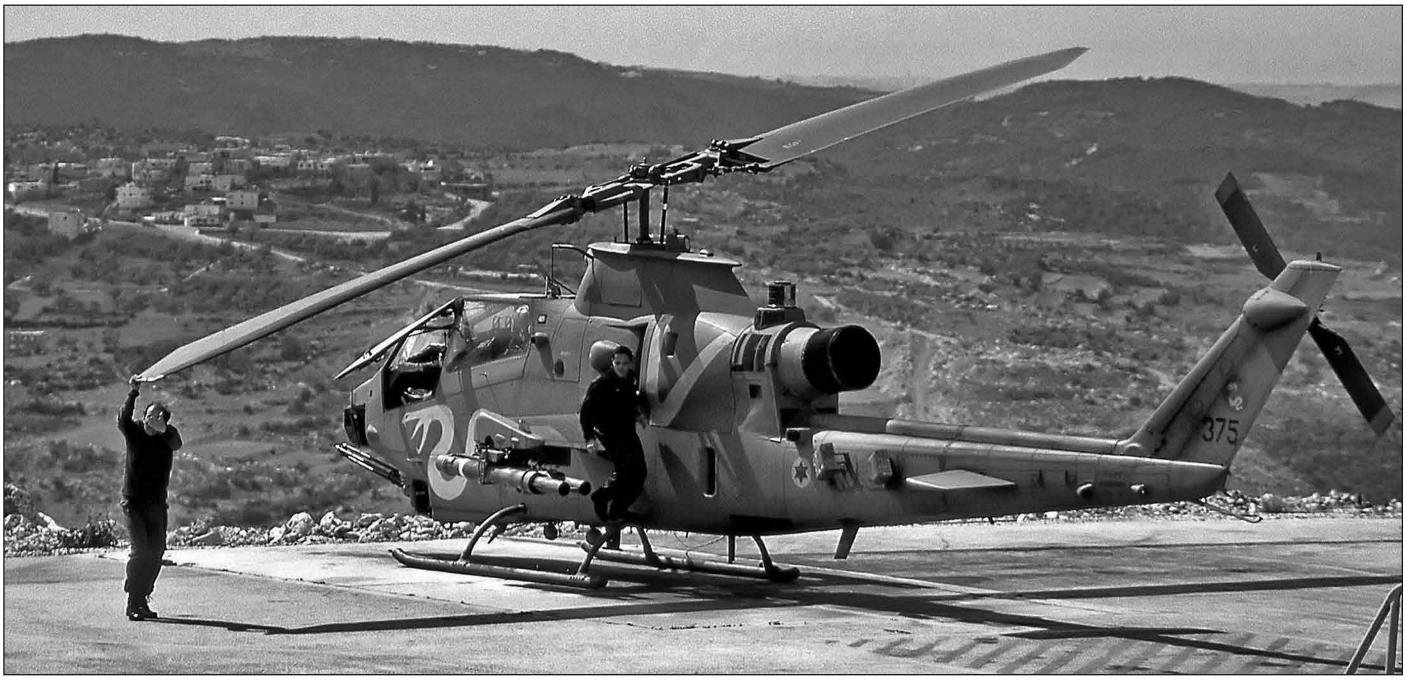
The Kfir was quickly turned to air-to-ground work as its principal role as depicted here with a 144 Squadron machine. The aging design contributed in Lebanon after the air defense threats were blunted. The last model of the Kfir was the C7 with PGM capability provided by the Pave Penny laser spot tracker pod under the nose (inset) supporting Paveway bombs. (Ofer Zidon Collection)

The Lebanon SAM suppression and air combat success against Syria were certainly achievements the IAF heralded. However, within a year the Soviets made good the losses, eventually supplying MiG-29s and even more potent air defenses to Syria. Early in 1983, the country received the first S-200 missiles deployed outside the Union of Soviet Socialist Republics (USSR), manned and controlled by Soviet air defense troops. The missiles' 150-mile (241-km) slant range placed at risk aircraft well outside the combat zone and even over Israel. The USSR warned that they would punish Israel if the batteries were attacked.

Syrian MiG-23s were downed in November 1985 by Israeli F-15s. With this appearing unnecessary and such action potentially provoking unwanted trouble, the fighter pilots were reined-in somewhat by new ROE.[15] That was the last enemy fighter kill to date of writing.

A complete evacuation of Lebanon, save for a security zone 2 to 9 miles (3 to 14 km) beyond the Israeli border, was executed in 1985. For the next 13 years, the Israeli patrols, occasional penetrations by sizable forces in pursuit of Palestinian squads, IDF shelling, and airstrikes showed little sign of abating. The IAF flew frequent combat missions across the border to attack identified training camps and arms caches, either in anticipation of terrorist activities or in retaliation. The cost in lives and shekels was seen as the price of security, but it was increasingly unpopular within Israel and the military. It at least provided a continuing opportunity for combat experience plus test of equipment, processes, and tactics.

The Air Force helicopters became an essential element of virtually every military operation in Lebanon – ferrying troops, serving as stand-by medivac aircraft, and gunships ready to lend support or initiate an attack. The attack choppers assisted patrolling the border and security zone. They provided CAS to ground-pounders, usually suppressing especially heavy resistance or helping extracting a team from a dicey situation. Flying QRA to hunt for rocket launchers and their crews following shelling was another vital task. The gunships typically worked in pairs so that one could concentrate on attack while another watched for threats. There were usually fighter-bombers overhead and rescue



The attack helicopters came to be the principal quick-reaction asset for operations in Lebanon. The IAF built dispersal bases on the border to facilitate this capability, Biraneet shown here. The 160 Squadron Cobra is in one of the final configurations for the type in IAF service, with "hot brick" IR jammer above the engine exhaust, RWR and self-protection antennas, and added flare/chaff dispensers on the tail boom. The yellow chevron markings were added during the 1982 fighting to enhance recognition of own-force rotorcraft. (IAF Magazine via Ra'anan Weiss)

The attack helicopter missions in the southern Lebanon security zone could be very violent and the gunships were occasionally instrumental in saving the lives of infantrymen who were pinned down in ambushes. Two Cobra aircrew were award medals for such an action executed on September 15, 1987, one receiving the Chief-of-Staff's Medal of Praise and the other the Air Force Commander's Medal of Praise. In 1986 alone, six such decorations were awarded to helo pilots for action in Lebanon.

The loss of an F-4E near Sidon on October 16, 1986, occurred when, according to the IAF, a defective fuse caused a 500-lb (227-kg) bomb to explode upon release. (The PLO insisted that they shot the jet down with an SA-7.) The pilot, Yishai Aviram, was rescued by clinging to the landing skid of an AH-1 helicopter after being located by a Scout RPV. The navigator, Ron Arad, was made a captive of radical elements inside Lebanon. The largest search effort ever undertaken by Israel, or possibly any nation, for a single individual yielded nothing. Passed between militias, he is believed to have died in 1988 or 1995, but confirmation and a body never emerged. After Aviram's rescue, the Cobras were fitted with straps inside the fold-down ammo bay doors such that survivors could sit on the door securely while being lifted to safety. This was used on December 9, 1988, when four soldiers were rescued by two Cobras.

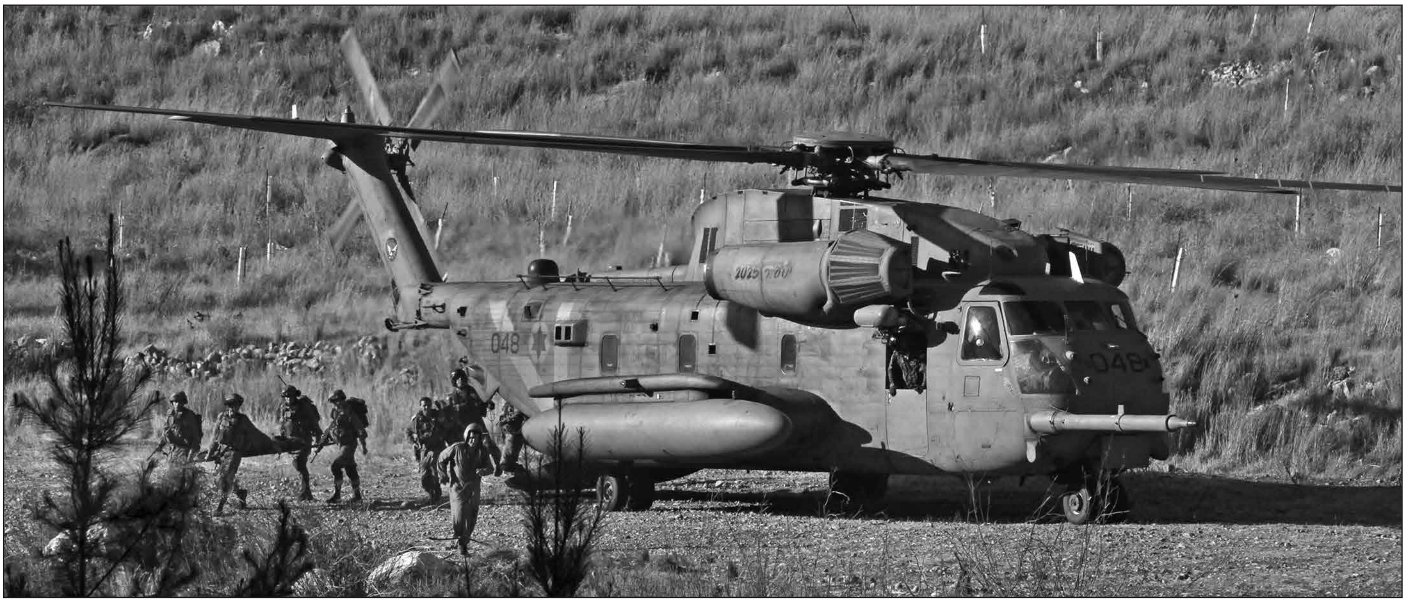
choppers on standby if things went awry. The work involved much night flying with NVGs and NOE for which the crews were then receiving considerable training. These successes convinced most doubters that the choppers could perform the CAS mission, freeing up the fast jets for interdiction and tasks requiring heavy ordnance.

Initially, the IAF hesitated to use the attack helicopters for pre-planned strikes against pinpoint targets. The principal fear was the vulnerability of the aircraft and the possibility of aircrew being captured. However, recognizing the ability for a relatively stealthy ingress to precisely hit targets with reduced collateral damage, the policy was changed in 1987. Such attacks were reportedly carried out as far north as 50 miles (81 km) from the border. These were truly "surgical" strikes made in built-up areas where missiles could be guided through windows of buildings, door of a bunker, or to hit a moving vehicle. By 1990, the attack helicopters were being used as often as fighter-bombers during the many attacks in Lebanon.

Despite progress towards peace with its neighbors, the Lebanon conflict remained a thorn in Israel's side. Palestinian factions faded in the shadow of the Shi'a Muslim militia group *Hezbollah* that arose to oppose the Israeli occupation, its continued military dominance, and its fundamental existence. Hezbollah ultimately displaced nearly all other militias in the south, with funding and training from Iran. Syria accepted this arrangement and encouraged Hezbollah to torment Israel endlessly provided this did not provoke a military conflict challenging Syrian dominance inside the country.

The 1989 Taif Accord created conditions for an end to the Lebanese civil war, but at the cost of yielding more authority over internal affairs to Syria. During the 1990-1991 Gulf War crisis Damascus took the opportunity to extend its influence over the whole of Lebanon. They subdue the recalcitrant Christian forces and Israel did not intervene owing to greater concerns to the east. Despite most of the militias being disbanded, the central government was still unable to rule in the south where Hezbollah dominated security and social services. Its military wing expanded operations beyond Lebanon and used every terror means including car and suicide bombings, small-unit infiltrations, kidnapping, and shelling.

In the summer of 1993, repeated Hezbollah rocketing of northern Israel and attacks on Israeli patrols brought a week of air, naval, and artillery bombardment. Over 300 attack sorties, and



The CH-53 supported special operations since its inception with the IAF in 1969. Modifications to enhance night operations included low-light television and night vision goggle compatibility plus improved navigation gear. Also reworked to extend their service life, this example has Yas'ur 2025 upgrades to include satellite communications (SATCOM, black antenna dome atop aft fuselage). (Ofer Zidon Collection)

1,000 of all types, were flown. Every IAF combat squadron contributed to the action, but combat helicopters played a disproportionately large role with about 350 sorties. These could strike rocket and artillery sites that were only active in the dark. Some 118 persons were killed and 500 injured, mostly civilians, and thousands of homes damaged.

By early 1996, the Hezbollah threat again grew intolerable. This sparked the largest Israeli military operation in a decade. During the 16-day operation the IAF flew some 2,350 sorties (400 by attack helicopters), of which as many as half or as few as 550 were airstrikes. The first week was almost entirely an Air Force show, but the airplanes and helicopters later worked in conjunction with artillery against tactical targets. It brought a new role for the attack helicopters in escorting troop and rescue choppers. The action left 154 people dead. Civilian infrastructure was included in the destruction, among them power stations and bridges, amounting to some $0.5 billion. Targets in Beirut were attacked for the first time in 14 years and the city "boomed" to further frighten the populace. The IAF efforts were later criticized as being indiscriminate and lacking in real military value. Airpower was again seen as a poor counter-terror tool, but it minimized IDF casualties.

The tit-for-tat contest with the Hezbollah militia continued. In 1999 alone, the IAF flew more than 200 strike missions in Lebanon. Another flare-up in 2000 saw Israel respond with a night of air attacks on Lebanese power stations, depriving half the country of electricity. After a year of comparatively high losses and growing resistance within the army to service in Lebanon, Israel announced in April 1998 its intention to withdraw. This occurred in 2000 without awaiting solid security arrangements. The SLA subsequently collapsed and Hezbollah reigned supreme in the vacuum. Nearly 800 Israeli soldiers had died in southern Lebanon to that time.

The IAF was to carry the offensive burden of protecting northern Israel after ground forces evacuated the security zone. Aerostat-mounted sensors, RPVs, and helicopter gunships were to do most of the work, although soldiers patrolled the border fence and artillery also responded to provocations. It is doubtful whether there was a day since about 1970 that Israeli aircraft did not overfly Lebanon uninvited.

Twenty years after the 1977 "Disaster of the 54" CH-53 crash that claimed 54 lives, it happened again. On the night of February 4, 1997, two CH-53 helicopters loaded with troops *en route* to the Lebanon security zone collided and crashed with all 73 aboard killed. This marked the worse air accident in Israeli history. Several changes to training routines followed. Israel subsequently performed substantial work at improving the crashworthiness of the Sea Stallion.

In March 1981, a Palestinian terrorist flew a motorized hang glider from Lebanon to Haifa and threw some grenades down onto the harbor before exhausting his fuel and being arrested after landing. In April, they tried a hot air balloon, but air defenses shot it down and the two fighters onboard were killed when engaged by IDF troops. The March incident may have inspired events six years later. On the night of November 25, 1987, two Palestinian guerillas flew across the border from Lebanon into northern Israel aboard one-person hang gliders, armed with personal weapons. Soldiers heard one and the terrorist was located then killed, actually within the Security Zone. The second landed near the IDF camp at Gibor. He first shot up a passing truck and then assaulted the camp. The sentry ran away and the terrorist entered and began shooting until eliminated by the wounded camp cook. Six soldiers were killed and eight others wounded. The hang gliders were nearly impossible to detect by conventional surveillance radar. The "Night of the Gliders" was one motivation for adopting aerostats tethered near the borders for persistent monitoring through radar and visual means.

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In time, the F-16s came to contribute to air-to-ground combat. Its capabilities were extended to PGMs via a Pave Penny pod for laser spot tracker mounted off the starboard side of the intake, as was added to the Kfir C7s. The 144 Squadron operated this F-16A. (Author's Collection)

CHAPTER 3

GROWING COMPLEXITIES

The probability of Israel finding itself at war with its neighbors remained low into the 1990s as peaceful solutions to the conflict gained traction. While the armed forces prepared for any eventuality, its principal focus shifted to domestic security, thwarting international terrorism, and preparing to respond to nations seeking to undermine Israel by means other than open warfare. For the IAF, these challenges required a broad variety of weapon systems and tactics, but particularly more distant reach, complex electronic systems, and very skilled personnel dedicated to maintaining high standards.

Endless Pursuit

Israel had persistent concerns that its Air Force's qualitative advantage was being eroded by the acquisition of more sophisticated weapons by its adversaries. Apart from Soviet arms sales in the region, American equipment was being sold to Egypt, Jordan, and Saudi Arabia in satisfying USA national interest and seeking a rough regional balance. Although the Americans provided Israel with many new weapons and much monetary assistance, the budget went just so far and the "patron" occasionally demurred at some requests. Additionally, the USA had concerns that some American technologies were making their way into competing Israeli products.

The outsized American assistance to Israel in maintaining large and up-to-date conventional defense capabilities may have been, in part, to ensure she would never feel compelled to employ unconventional weapons. The USA financial aid to Israel was the largest provided any country (a third of all foreign assistance), and under the most liberal of terms. Military assistance funds and grants continued to rise until the latter peaked at $1.8 billion per year. The forgiven portion of loans had also increased until all of the account was being forgiven after 1985. Unlike other nations receiving USA economic aid, Israel was allowed to use the money almost without restriction and review. She received the funds in one lump sum at the beginning of a fiscal year rather than in quarterly installments. Israel was also allowed to borrow against future monetary assistance for urgent short-term spending. One consistent stipulation was that arms purchases were to be made in the United States, although this was relaxed over the years. As a measure to cut its own expenditures, the US Congress ceased adjusting the $1.8 billion for inflation or currency fluctuations, producing a 40 percent decline in purchasing value over time. Yet, the quantity was still approximately 10 percent of Israel's defense budget, not counting other assistance diverted to this aspect of the national budget. For example, the USA permitted up to $200 million of the $1.2 billion in annual economic assistance (all grants) to be converted to military expenditures. The Americans also guaranteed bank loans for the country. Excess Department of Defense equipment and munitions were given to Israel free-of-charge. Moreover, one-time plus-ups to aid were occasionally made for unique circumstances. Israel also receives $1 to $2 billion in private donations and national bond purchases. The USA government allowed contributions by Americans to be tax-deductible. By the end of the century, America was responsible

Very little of the bribery and other corruption that is commonplace in the Middle East had touched Zahal. However, one notable exception was a stain on the Air Force. Brigadier General Rami Dotan, Head of the Materiel Group in the AHQ, was convicted in 1991 of embezzling $40 million of US Foreign Military Sales funds by submitting false purchase orders for F-16C/D Block 30 F110 engine logistical support prior to 1989. Although much of the money was diverted to unauthorized military projects, Dotan was also accused of taking $10 million in bribes to favor certain companies bidding on IAF engine contracts. A General Electric manager was also involved in what came to be called the "Dotan Affair." Arrested in October 1990, the general was demoted to private and sentenced to a 13-year prison term.

The IAF performed the usual flightline and routine periodic maintenance, as does any air force. Heavy depot maintenance was a mix of contractor and military services. This UH-60 from 123 Squadron is well into its maintenance period. It displays some of the Israeli-unique self-defense modifications. (Ofer Zidon Collection)

The first of five Beech RC-12D Guardrail arrived from the USA in 1985 and two RC-12K in 1991. The aircraft identified and geo-located electromagnetic emissions, downlinking the data to ground stations for analysis as part of broader EW capabilities. This RC-12K bears the markings of 135 Squadron. (Ofer Zidon Collection)

for $10 billion flowing annually to Israel in one form or another. Taken all together, over the decades this had averaged to approximately 20 percent of the defense budget, but had been as high as 27 percent.[16] The IDF's equipment and readiness, if not government security options and the affluence of the country itself, would have been quite different without this assistance.

The IDF remained more than a match for any realistic alignment of regional forces and, fortunately, there were no large-scale wars causing major equipment losses. Although equipped to a superior technological and numerical level by the late 20th century, the IAF continued to seek the best fleet and capabilities based on threats and budget. The Air Force also supplemented foreign weapons with indigenous systems, though any purchases with American aid funds normally compelled many elements to be purchased from or produced in the United States. Attempting to answer every threat and prepare for every potential mission by sustaining relatively few examples of many systems was very costly. Compared with potential warfare scenarios, much still depended on available weapons and their state of modernization, operator proficiency, and integration into the whole of the nation's warfighting prowess.

Israel sought to maintain a qualitative advantage in training, tactics, and readiness to compensate for any hardware shortcomings. The IAF worked especially to enhance its night combat and stand-off weapons delivery capabilities by investing in cutting-edge subsystems. NVGs and FLIRs were among these integrated into existing aircraft and operators trained to employ them to advantage. The Air Force continued to improve its battle management network to get the most from its assets, constantly working to integrate combat data from a variety of systems and making these rapidly available to commanders and pilots.

In December 1983, the Air Force underwent a significant reorganization that included creating the post of Chief of Air Staff to command the AHQ. Likewise, the Army was given an independent presence in General Headquarters (GHQ) with creation of Ground Forces Command. Also during this period of the mid-1980s, the IAF was planning to grow to 10 major air bases, 24 fixed-wing combat squadrons (30 total), and 700 combat aircraft by the mid-1990s.[17] More F-15s and F-16s were to be acquired while the F-18L and indigenous Lavi fighter-bomber (*q.v.*) would replace the A-4s and Kfirs. The aerial refueling tanker force was being grown and ballistic missiles had been deployed. However, a marked economic downturn prevented achieving most expansion goals. Instead, earlier aircraft were upgraded to current standards and continued to serve. Many older aircraft were retired while the acquisition of new aircraft was reduced and the Lavi cancelled. The shocking Lavi decision (*q.v.*) represented an end to the legislature and cabinet's acquiescence to fund the MoD with little argument. The defense budget finally began to decline as threats receded.

By the end of the century, the IAF had 569 combat aircraft in 20 squadrons on eight air bases – little-changed from 1982. Many factors contributed to the IAF's inability to complete its expansion and modernization plans. Funds from America decreased due to the general economic downturn and the capping of USA military assistance. Severe cuts followed, with the MoD budget slashed by 20 percent in the hyper-inflationary period of the 1980s. Defense outlays had averaged 24.5 percent of the Israeli Gross National Product (GNP) in 1978 to 1980 – among the highest of any nation. Deep cuts followed in the 1990s as well, with 14 percent of GNP going to defense in 1991 and about 9.7 percent by 1996. Upgrades and restoration programs helped sustain prior-generation aircraft so they could serve longer in a useful capacity, even if falling to second-string. This became the norm for the IAF. Yet, these programs were themselves expensive and had to be stretched out over many years. Several squadrons were disbanded and their aircraft placed in storage to trim operating costs, affecting some 15 percent of the fleet. The number of pilots also shrank and flight training hours were cut. In another note, in January 1999, reserve pilots refused to fly until the Air Force provided them adequate insurance.[18]

Balancing Act

The fighter-bomber force continued evolving as the IAF sought to modernize and expand its capabilities. Attempts to grow the F-15 fleet was slowed by budgetary impediments, but the few acquisitions emphasized two-seat Ds. The F-15Cs and Ds were concentrated in 106 Squadron who emphasized air-to-ground tasks. Modifications to the Ds to employ PGMs included displays and controls in the rear cockpit to operate the GBU-15 TV-guided

10th Commander – Amos Lapidot enlisted in 1953 and, after a brief time in the Artillery Corps, was accepted to pilot training. In those years, he followed the usual fighter pilot path of Spitfires and P-51s to Meteors and then Ouragans. He ended up spending 20 years at Hatzor AB. During the Sinai Campaign, he flew Ouragans and Mystère IVAs from there. In 1962, he moved to Mirages as a deputy CO of 101 Squadron, moving into the commander's office in 1965. That was his post during the Six-Day War. After a spell in college, he served in the AHQ as head of the Weaponry Department then returned to Hatzor in 1973 as the wing commander. There he flew Phantoms during the Yom Kippur War and on one sortie he made an emergency landing in a jet damaged by a SAM. Returning to headquarters in 1975, Lapidot led the Intelligence Group and later the Air Group. After studying in the USA, he returned to be assigned to oversee the Lavi fighter program, but in December 1982 was tapped as the new Air Force Commander. During his tenure, he struggled to keep the force current with advanced weapons while being pressed to cut budget. In 1985, he oversaw the complex strike on the PLO offices in Tunisia before moving along during 1987. He subsequently established an aviation consulting company.

Amos Lapidot climbs from the cockpit of a Kfir during his time as Air Force CO in the mid-1980s. (Ofer Zidon Collection)

bombs and Popeye EO missile (*q.v.*). Aircraft were also modified for optimized QRA by receiving data via cable to permit scramble instructions without transmissions, and to permit radar operation on the ground to aid surveillance coverage.[19]

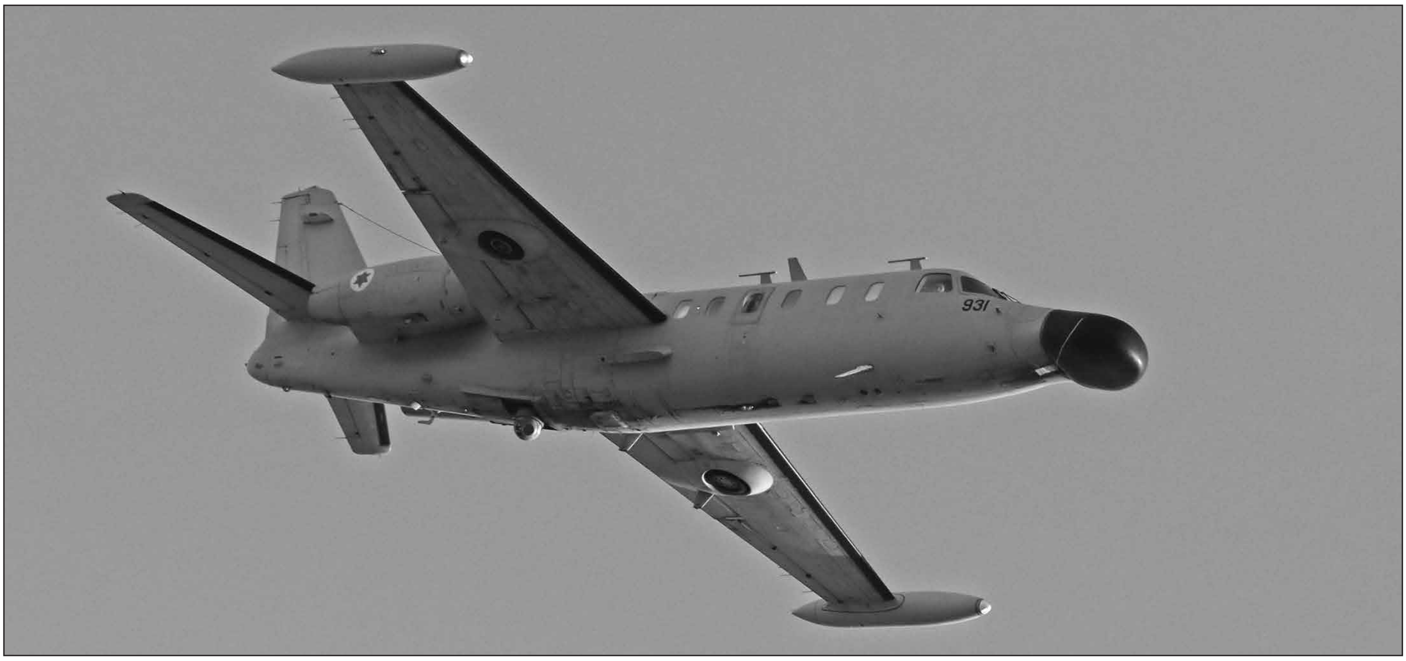
Delivery of 75 more F-16s was delayed 11 months by American displeasure with the 1982 Lebanon operation. They also suspended deliveries of cluster bombs for six years, prompting the Israelis to develop their own. The nation, and the IAF in particular, was disturbed by this significant American influence on its defense resources, and especially the growing expense of such equipment, but there was no turning back. At $2.9 billion, the F-16 deal included 51 Cs and 24 Ds plus a simulator. The simulator meant that crews would not have to travel to the USA for continuing training, as was the practice with other types. The disproportionate number of two-seaters showed the growing emphasis on crew cockpits for precision strike missions. The Cs and Ds equipped separate squadrons. Notable was the increased complexity of these F-16s, marking a departure from the prior IAF goal of seeking relatively simple warplanes. The threats were themselves too complex and numerous to ensure success without the most advanced systems for destroying targets with as few warplanes and risk exposure as necessary.

The new Block 30 F-16C/Ds were significantly different from the earlier models, including a different engine, but also contained unique features requested by the IAF. They would normally have been identified as a new model, but this was not done as a means of downplaying the added capabilities in public disclosures. Notable were compatibility with IAF weapons, kit for operating the GBU-15, a greater weapon load with higher gross weight, Israeli computers for combat systems, and addition of local EW gear. All had an expanded island at the base of the vertical tail for electronic equipment while the Ds added a spine fairing for "black boxes" supporting the SEAD mission. The IAF also developed enormous 600-gallon (2,271-l) drop tanks.

The A-4 and F-4 fleets continued to be drawn down as the fourth-generation jets filled aprons and budget cuts had to be found. Replacements for the remainder were unaffordable. The A-4Ns were fitted with a new bombing system that improved delivery accuracy of freefall and glide bombs. Some were also provided with a laser-guided bombs (LGB) capability. Although it only permitted the aircraft to receive the laser energy radiated from a target illuminated by some other sources, including a ground combat team, but it was a start.[20] Consideration of upgrading Skyhawk engines was shelved owing to fiscal obstacles.[21] The Phantoms were concentrated in fewer bases, seeking two squadrons each, as another money-saving measure. They still represented a relatively inexpensive force for delivering heavy ordnance. Some began carrying a Pave Spike TV/laser pod to designated targets for the American Paveway family of LGBs they also deployed.

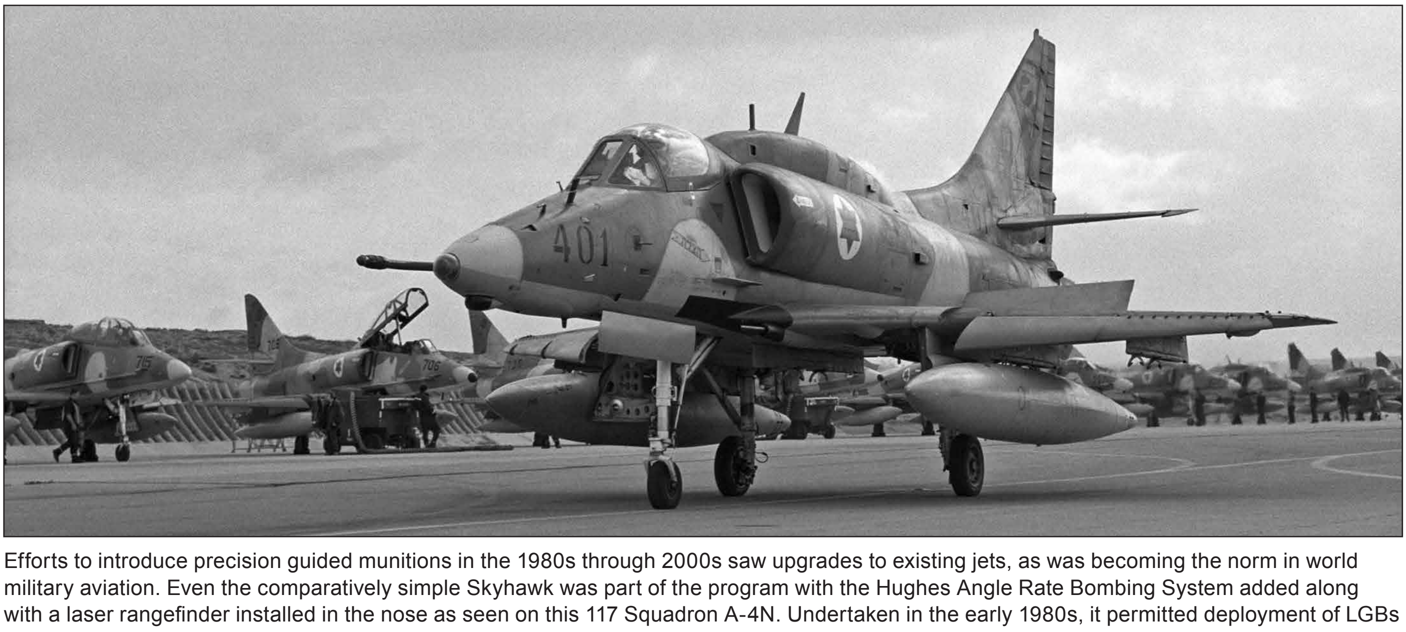
Kfir production continued at a low rate to keep the IAI production line "warm" in anticipation of a follow-on program. An effort at sustaining the relevance of the aging design was the C7 variant. Its attack avionics, radar, navigation system, and self-protection EW capabilities were all improved, a new HUD installed, single-point pressure refueling added along with more fuel volume, and the engine was upgraded. These changes increased survivability plus mission effectiveness, and gave marginal weight and range improvements. The last of the 30 C7s were given the capability of deploying LGBs with a Pave Penny pod added under the nose for laser spot tracking – receiving laser energy radiated by the target designated by another source.

Kfir production finally ended in 1986 at 212 aircraft. Israel was eager to continue fighter-bomber development and production in-country as a means of remaining somewhat independent of foreign sources and for economic reasons. Aircraft production capabilities had grown alongside the Kfir with a business jet and light transport also being manufactured. Unique elements for upgrades of earlier


The three Sea Scan aircraft served for decades, reduced to two in the final years, and finally replaced in 2017 by UAVs. In perhaps the last decade, they were modified with an EO ball mounted in the belly (and likely retractable) to take advantage of technology developed since introduction of the aircraft equipped with a sea-search radar and scanning visual windows. (Ofer Zidon Collection)

jets and commercial aircraft were becoming a specialty along with offset arrangements with American firms and Israeli content in new-production foreign products. By 1980, weapons sales made up 30 percent of national exports and employed 20 to 25 percent of the workforce. Therefore, IAI confidently conceived a new fighter that morphed as the Air Force provided feedback. As an extension of the Kfir work, this became a single-engine, delta-wing jet with canards called the *Lavi* (Young Lion). The decision to proceed depended on other procurements, especially as the IAF was seriously considering a large commitment to a unique strike variant of the F-18. When this faded during 1979-1980, the MoD encouraged the Air Force to consider the IAI design. It would replace the A-4 and Kfir within 10 years – the low end of the high-low mix. A two-seat variant was also to replace the TA-4 in advanced training.

The formal Lavi go-ahead came in 1980 with an expected budget of $1.8 billion. Full-scale development began in fall 1982. Plans evolved around a buy of 240 single-seat and 60 dual-seat machines at a peak 30 to 36 per month and $10.8 to $30.0 million a copy. Observing that low-end fighters like the Kfir had a shrinking role in the evolving battlefield, with possibly low survivability, the Lavi evolved into a highly integrated multi-role fighter-bomber with extensive avionics and electronic flight and engine controls, comparable to those being built elsewhere in the world. Consequently, program technological risk rose, costs increased, and the schedule grew. By 1983, funds were becoming short, but the Israel lobby in the USA managed to get some aid money approved for use on the Lavi – an extraordinary reversal of long-standing American policy. American content expanded with USA firms contributing to the design and expected to build 50 percent of the airplane. This would limit sales of the final product to those countries approved by the Americans, just as it had the Kfir.

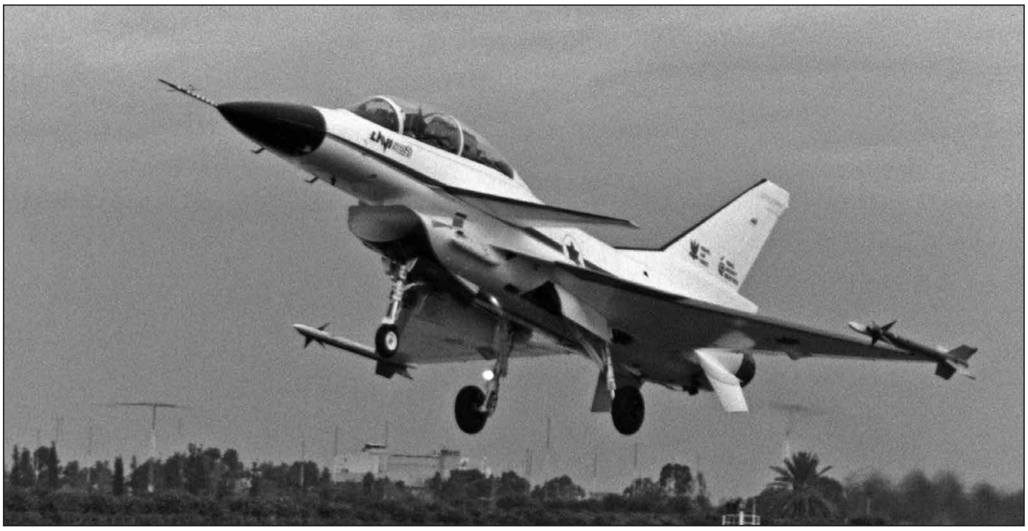

Efforts to introduce precision guided munitions in the 1980s through 2000s saw upgrades to existing jets, as was becoming the norm in world military aviation. Even the comparatively simple Skyhawk was part of the program with the Hughes Angle Rate Bombing System added along with a laser rangefinder installed in the nose as seen on this 117 Squadron A-4N. Undertaken in the early 1980s, it permitted deployment of LGBs provided the target was illuminated by another platform. (Ofer Zidon Collection)

The first Lavi flew on the last day of 1986, a year behind schedule and well over-budget. Initial deliveries were not expected until 1991. Planned production rate shrank to stay within budget and the IAF reduced its anticipated buy, both causing unit price to rise to as much as $50 million. Full capability and squadron mission readiness might be too late to meet Air Force needs. By 1987 the nation had spent $2 billion on the Lavi before production had even begun at a time when inflation as raging at over 1,000 percent. Some 90 percent of the effort was paid for by American military aid while USA manufacturers protested taxpayer support for an aircraft that would compete with their products.

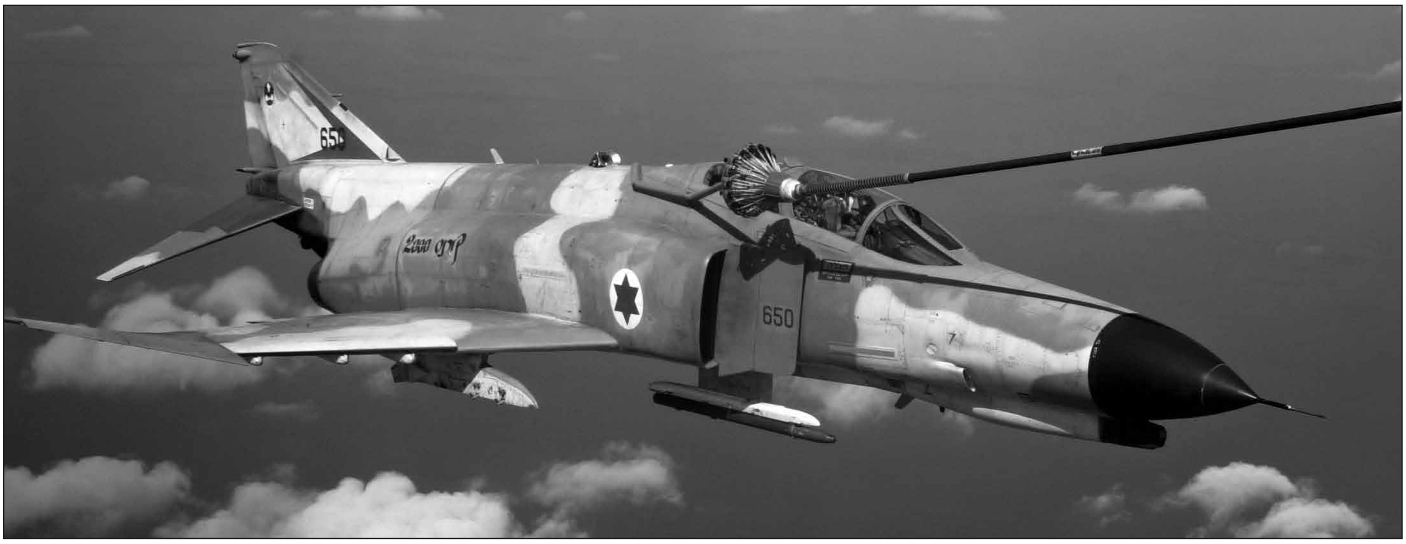
Although the Americans made clear the use of aid was up to Israel, they pointed out the future implications of such huge outlays. They offered alternatives, including coproduction of some American fighter. Many Israelis saw all this as entirely self-serving. As the Lavi came to consume 25 percent of USA aid, the General Staff backed away and some in the IAF also voiced doubts, the Knesset was split, and a contentious national debate ensued. Other priorities would suffer deeply with so much of the budget consumed by the Lavi. This was one of the first occasions when the legislature and many senior government voices spoke out against a major MoD undertaking.

The cabinet decided by one vote in August 1987 to terminate the Lavi program. This was tacit acceptance of American dominance of Israeli defense procurement and some indirect control of its military choices as their likely response would have to be considered. The Israeli aerospace industry took a big hit and struggled for years after. Its assistance to the People's Republic of China in developing their J-10 fighter helped reduce the pain. However, the USA concluded that the assistance had included unauthorized transfer of American technology shared during development of the Lavi. This caused a major row and the USA suspended technology transfers to Israel for a brief period.

An immediate outcome of "The Lavi Episode" was a decision to proceed with upgrading 100 Phantoms. A Super Phantom had been offered by IAI that included re-engining, but the IAF could not afford this. They settled on content that amounted to $8 million per airplane and a total $900 million for the program. Each aircraft required 10 to 12 months to complete and delivery was about 10 per year. The *Kurnass 2000* included structures and systems restoration that simplified maintenance, a new multi-mode synthetic aperture radar, wide-angle HUD, and new mission avionics. Beginning in 1987, the effort was ultimately wrapped-up in 1994 with just 54 delivered owing to the type's diminished importance.



The initial Lavi prototype is seen lifting off on its first flight, December 31, 1986, with test pilot Menahem Shmul at the controls. Seeking an indigenous fighter to fill many roles, the program was a source of great national pride, but turned sour under the glare of ballooning budget and large schedule slips. The Lavi was cancelled seven months later amongst great rancor and set off a search for new IAF aircraft. (Ron Feldman Collection)



The Israelis developed the probe refueling capability for their Phantoms very early in the type's service with the IAF. Note that the AR receptacle for boom refueling is deployed to make the system ready to take fuel via the drogue – in this case from a KC-130. The aircraft is a Kurnass 2000 from 119 Squadron out of Tel Nof AB carrying an instrumentation or training round on the Israeli AIM-9 launcher in the right-hand forward Sparrow cavity. (IDF Spokesperson via Ofer Zidon)

The IAF concurrently explored other post-Lavi procurement options. This was done considering the timescale for delivery, incorporating much of the Lavi avionics content developed specifically to Air Force specifications, and meeting the growing complexity of the fighter-bomber mission. In the meantime, in the late-1990s, the Pave Penny laser tracking pod was added to two squadrons of F-16A/Bs and two of F-16C/D for additional LGB capability.[22]

An immediate action was to order more F-16C/Ds in a 30:30 mix – a compromise on the desire for all two-seaters compelled by costs. They differed from the earlier machines in being heavier Block 40 airframes with more fuel and payload. Unique changes included wide-angle HUD, NVG-compatible cockpit, a mix of USA and Israeli EW content, compatible communications gear, and revisions to some computers. There were also provisions for the two pods making up the Low Altitude Navigation and Targeting Infrared for Night (LANTIRN). This supported low-level terrain-following flight at night and in inclement weather with superior navigation cueing. The cheaper Sharpshooter pod was substituted for the LANTIRN targeting unit to give the LGB capability. Little more than a dozen of these expensive systems were procured and to be carried only the F-16Ds. Still, they would significantly grow the IAF's night attack capabilities, especially as many interdiction targets moved only at night.

Unlike the Block 30 airplanes, the single- and dual-seat Block 40 jets were mixed in squadrons. This sorted out to Hatzor AB being an all-Block 40 base and Ramat David Block 30.

As part of the reward to Israel for its restraint during the Gulf War (*q.v.*), and compensation for the large arms packages sold to Saudi Arabia and the Gulf States, the USA supplied Israel with $700 million package of military equipment. This eventually resulted in the transfer of 147 military aircraft from the American arsenal. Although the equipment was previously owned, and in some cases outdated, they allowed the retirement of earlier types while substantially boosting some capabilities.

The post-Gulf War largess included 25 F-15As and Bs. These needed modifications to be fully compatible with the rest of the fleet and were considered in excess of need, so the As were stored. The IAF finally had all the jets it needed or could afford to operate. The service began a modest upgrade program for its F-15s in the 1990s focused principally on computers, sensors, and other avionics. Also transferred were 50 early production F-16A/Bs. Although they lacked the upgrades introduced on the existing fleet, they were superior to Kfirs and Skyhawks, and so displaced some of those machines. The last Kfirs were retired in 1995.

Near the end of the century, many older fighter-bombers had been withdrawn and stored. These were initially wrapped and occasionally subjected to attention such that they could be reactivated with a few weeks of restoration maintenance. In time, it became clear this expensive practice was impractical and any reasonably envisioned war would not be of sufficient length or intensity to see such old weapons deployed and operated

The cancellation of the indigenous Lavi fighter-bomber set in motion other acquisition efforts to include Block 40 F-16s incorporating some of the Lavi avionics. The F-16C incorporated more precision attack capabilities. This 2018 image of a 117 Squadron Block 30 airplane, parked at Ramat David AB, has inert 2000-lb JDAM bombs and Sidewinders. (Yoav Efrati Collection)

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As the threats of a major war receded in the 1990s and budgets were cut, older aircraft were stored in a manner to permit restoration to operational use if 'the worse happened.' Later, they were simply stored without preservation, parted-out, or used as gunnery targets. Storage locations included Ovda and Hatzerim, the latter where this image was captured showing F-4Es, A-4s, 500MDs, and Magisters. (Nir Ben-Yosef Collection)

The F-16D carried precision navigation and strike even farther with additional avionics within the spine hump and targeting pod. It continued the two-seat attack tradition established by the F-4E. This 109 Squadron Block 30 aircraft carries a Spice bomb and Python 5 missiles. (Ofer Zidon Collection)

effectively. Consequently, by 1999, retired airframes were parted-out, placed on ranges as targets, or simply collected in clusters and left to deteriorate if foreign sales were not forthcoming.

Adapting F-15Ds to the heavy strike missions and replacing the Phantoms would only go so far. What Israel really desired was the F-15E to reach such targets as Iraqi Scud missiles with precision strikes. That two-seat airplane had CFTs for a 2,400-mile (3,862-km) unrefueled range, LANTIRN, Global Positioning System (GPS) navigation, wide-angle HUD, and a 24,000-lb (10,886-kg) weapons load with PGM integration. The advanced synthetic aperture radar gave superior ground mapping to aid navigation and target acquisition. Long-range heavy strike missions were executable with more safety margin. Surprisingly, the Americans agreed to a sale without limiting any capabilities. However, the Israelis still sought to optimize the aircraft to their needs and worked with the manufacturer to develop the unique F-15I *Ra'am*. This including a holographic HUD, NVG-compatible cockpit, datalinks to ground stations, and integration of Israeli tactical EW systems and PGMs. The jet was perhaps the most sophisticated combat aircraft the Americans had ever exported.

The F-15I's high cost meant delaying other purchases, but the capabilities it brought were considered essential. The deal totaled $2.4 billion for just 25 airplanes (the desired 50 being beyond reach), or over $105 million each with training and logistics support. The maximum 86,000 lb (39,009 kg) gross weight, and desire to raise this to 92,000 lb (41,730 kg), meant the runways had to be reinforced at Hatzerim AB where 69 Squadron adopted the Ra'am. Other construction included new HAS and a building for the simulator. The principal PGM were the GBU-15 and the Popeye (*q.v.*).

The choice of 69, inactive since 1994, but reformed to operate the Ra'am, illustrates another aspect of the IAF. Veterans of historical squadrons pressured decision-makers to reconstitute their heritage outfits on new and especially notable aircraft. Unit designations were recycled throughout the Air Force's history.

Israel bought the full LANTIRN kit with the Ra'am. The growing importance of EO targeting for "smart bombs" saw some Block 30 F-16Ds modified to carry the Sharpshooter pod. In 1997 the IAF also purchase a number of the locally developed Litening, an all-weather/day-night targeting pod.[23] Such capabilities did not come cheaply; the Litening running $1 million each. It was adopted to F-16 Block 30s and 40s that also occasionally carried the LANTIRN pod, Pave Penny remaining an option.

Israel also developed the air-launched Rafael Popeye, a 3,000-lb (1,361-kg) stand-off TV-guided missile with 750-lb (340-kg) warhead and a typical 58-mile (93-km) range. Like the GBU-15, it worked with a datalink pod and its seeker provided the image to a cockpit targeting display.

This 106 Squadron F-15D fitted with conformal fuel tanks carries the heavy, EO-guided Popeye stand-off munition with a centerline data pod. The IAF equipped the two-seat Ds for air-to-ground combat, particularly stand-off and precision strike. Their 1985 attack on the PLO headquarters in Tunis employed F-15s delivering GBU-8 TV-guided bombs that also required the centerline data pod. (Ofer Zidon Collection)

The F-15I introduced the AIM-120 active radar homing BVR missile of much superior performance to the AIM-7. Israeli AAM development continued, responding to the Soviet AA-11, with the Python 4. Introduced in 1993, the Rafael weapon possessed high off-boresight angle engagement and high maneuverability, and corrected a Python 3 tendency to "run away."[24] It was also integrated with the Display and Sighting Helmet with which the pilot's line-of-sight was used to cue the radar steering to which the missile's seeker head was slaved. This capability was built into the F-15I and later fighters. It allowed a rapid positive acquisition of the target for a "see-and-kill" capability. Israel led in the development and production of such helmet-mounted sighting systems. The fielding of these products, well ahead of other Western nations, demonstrated the ability of Israeli industry and government to respond more quickly to its defense requirements. The Israelis were willing to accept incremental solutions in order to field critically needed technologies while obtaining operational performance data. Adoption of a rigorous development and test regimen in the 1980s did slow the process, but ensured more success. However, like the Python 3, the 4 was exceptionally expensive and aircraft routinely carried a mix of American and Israeli missiles.

Balancing a sale to Jordan, the Americans agreed to sell additional AH-1s to Israel. Finally able to expand a force that was proving quite valuable, the IAF acquired the latest AH-1S, later known as AH-1F. These 38 or so attack helicopters featured improved fire control and navigation systems, pointed low-noise rotor blade tips, plus low-signature exhaust, while the Israelis ensured they had good EW elements plus more flare/chaff dispensers. The remaining early AH-1Ss (converted from Gs) were withdrawn while the other Cobras were upgraded to roughly F-standard. The helicopters ceased carrying rockets except night illumination rounds. Introduction of the Night Targeting System then eliminated those as well.

The new Cobras allowed another attack helicopter squadron to be formed in 1980 focused principally on 500MD operation. The Defenders were clearly second-tier and no further investment was made apart from defensive systems. They began to be used as scouts with six unarmed MD500s purchased for this purpose and also operated by the AH-1 units for a time. The Cobras became the primary attack platform and a second unit was formed in 1985. The AH-1s dominated Palmachim AB, driving the Defenders down to Ramon in 1985. A few 500MDs were still operated by the AH-1 units until 1989.[25] The northern border tensions had the Hughes machines relocated to Ramat David in 1990.

The experience gained in Lebanon with the gunships, used principally as CAS and precision strike assets, convinced the IAF of their utility. By 1990, they were beginning to rival strike jets in responsiveness and accuracy. Desiring to stay in the lead with this technology, the service naturally sought the state-of-the-art AH-64. With the Apache would come its FLIR, day/night targeting via a direct view optical telescope, and up to 16 of the very capable Hellfire anti-tank missiles. A laser-guided weapon with 5-mile (8-km) range, the Hellfire was markedly superior to the wire-guided TOW.

The original plans were that the Cobras and Defenders would be phased out as the very expensive Apache was slowly acquired. However, with the USA having fixed its foreign aid to Israel, obtaining even one squadron seemed beyond the Air Force's means. A debate ensued over whether the AH-64 or the Black Hawk troop-carrier chopper should take precedence. The IAF championed the Apache while the UH-60 had the favor of the ground forces. The government backed the fliers. However, from their first stated goal to an actual order was seven years. The intent of including the OH-58D with the mast-mounted sighting ball for scouting and "lasing" targets was set aside as unaffordable. Procurement of 18 AH-64As was approved in 1990, but only after a prolonged debate with the General Staff as to what would go unfunded to make the buy possible. The Israelis also had to accept standard US Army aircraft without the option to introduce unique changes. The Apaches arrived in 1990 to 1991 and the team abruptly found itself hastening to prepare for possible war in Iraq (*q.v.*).

The outstanding night fighting systems of the Apache supported the IAF's goal of establishing a robust 24-hour attack capability. The IAF continued to seek more AH-64s, but the budget always lagged requirements. The service made a number of appeals to the Knesset for special funding, but to no avail. Then, as part of the post-Gulf War compensation package, the USA agreed to supply 24 used AH-64As. Work began to bring the new arrivals up to the standard of the existing fleet.

With integration of the latest Apaches, the 500MDs were definitely excess capacity and discharged as AH-1s assumed the scout mission. However, the Cobras were also upgraded to enhance their night capabilities.[26]

The AH-1s came to dominate the attack helicopter force in the latter half of the 1980s. The Defenders soldiered on as second-tier assets with no significant investment. In time, they came to be operated as scouts, and unarmed variants permitted greater endurance. This line of five such 190 Squadron unarmed helicopters occupies the flightline at Ramat David AB. (IDF Spokesperson via Ofer Zidon)

Long seeking the Black Hawk assault helicopter, they were final acquired in 1994 through American largess following the Gulf War. This 124 Squadron helicopter has had the Israeli flare/chaff dispenser brackets added to the tail boom and the IR jammer installed above the engine deck, though still wearing the colors of its former owner, the US Army. (Ron Feldman Collection)

Working to keep their small AH-64 fleet current with useful American upgrades, the IAF acquired the Target Acquisition and Designation Sight/Pilot Night Vision Sensor to provide day, night and limited adverse weather target information and navigation features. Israeli EW warning systems, flare/chaff dispensers, and sand filters were also added. The Hellfire 2 was introduced in 1998 with its multiple warhead options, another mile of range, plus a radar seeker that enhanced its operations in smoke and adverse weather. Unmanned Air Vehicles began to designate targets to be engaged by gunships outside small-arms range of the target.[27] The helicopters routinely operated with two 200-gallon (757-l) external tanks and eight Hellfires. The service began conducting its own Apache Operational Conversion Courses in 1997.

By 2000 the attack helicopter corps made up 17 percent of the combat aircraft, compared with 7 percent in 1982. They were displacing fixed-wing squadrons and seeing considerable action. This attracted the attention of fighter pilots who began to convert to these mounts, bringing new thinking to the squadrons. Legacy fixed-wing squadrons would soon be reincarnated as attack helicopter units.

The last Super Frelons were laid to rest in 1991. The CH-53s fleet grew substantially, although with used American aircraft in a variety of models and configurations. The IAF modified the helicopters to a common configuration that included external tanks, AR probes, door winches, Israeli communications gear, and their unique engine sand filters, while removing unnecessary features.

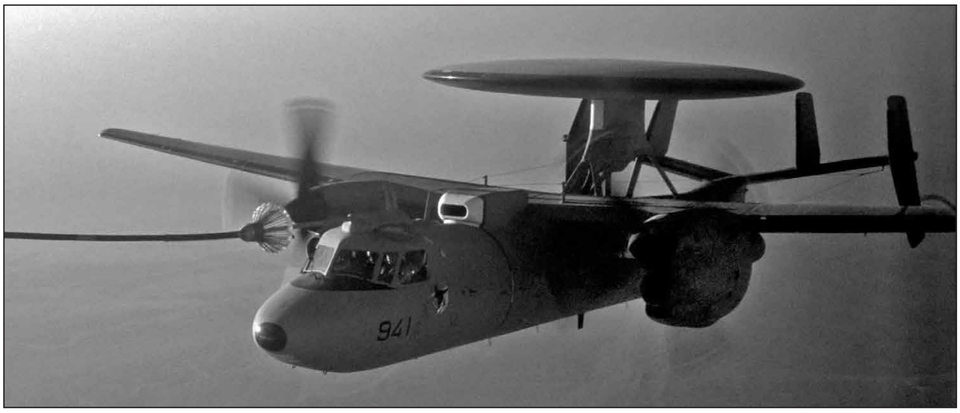
The age and flight hours on most of the 53s was increasing maintenance costs and reducing readiness. It became necessary to undertake a major overhaul and modernization program. This was executed by IAI that had been performing depot work on the aircraft under contract. The helicopters emerged at a rate of about two per year and approximately $3 million each over a decade for a total 37, giving the fleet a common standard close to the CH-53D.[28] Among upgrades were added armor protection, crash-worthy seats, enhanced intake sand filters, new mission avionics and cockpit displays, the cockpit made compatible with NVGs, self-protection systems, and improvements to increase gross weight. The IAF also introduced a locally produced helmet-mounted NVG/HUD to enhance the safety of night NOE. Another local product was the Airborne Search and Rescue System that worked in conjunction with aircrew survival radios to facilitate rapid CSAR by guiding the chopper crew to the survivor's location.

The IDF longed for the UH-60 Black Hawk, sharing the same engine as the Apache, to replace the Bell 212s with more capacity, speed, and range. Evaluations were encouraging, but budget prospects were bleak. Once again, fate intervened via the generous American offerings follow the Gulf War. Ten former US Army UH-60As were provided in 1994 along with aircrew training. Some work was required before placing these into service as a 124 Squadron Black Hawk flight. Over the coming years, some upgrades were performed to include EW warning gear, flare/chaff dispensers, the IR jammer above the engine compartment, and door guns.

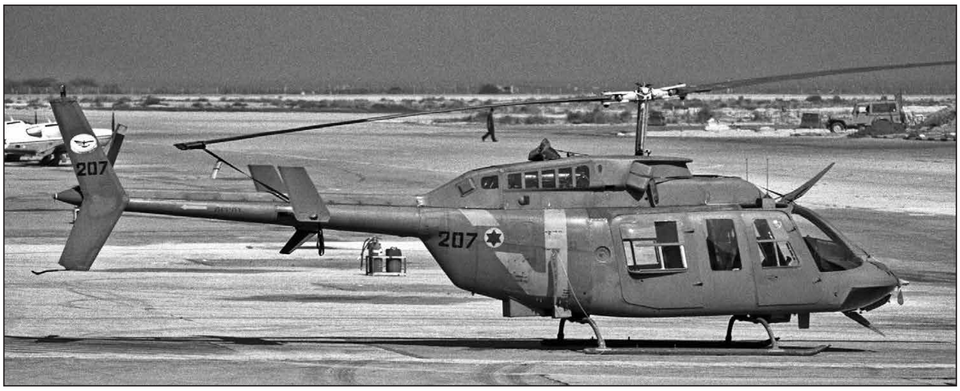
The IAF remained eager to acquire more UH-60s, especially as the aging Hueys became more expensive to maintain. Finally, 15 used UH-60Ls, although advertised as commercial S-70As, were delivered in 1998 and 124 pushed out its last Bell. The 123 continued operating 212s, but focused principally on training.

The E-2Cs were withdrawn in 1994 during a cost-cutting period, although the IAF said ground-based systems were deemed suitable enough to eliminate the expense of its operations.[29] The mission was clearly sacrificed to budget given that airborne AEW was reintroduced later. The equipment aboard the Boeings continued to be shifted to 707 airframes with fewer hours and later engines when funding permitted. However, the airplanes were growing dated and costly to maintain and operate. Yet, priority for their replacement continued to be low. There were no changes to the Hercules fleet save for some minor communication and navigation systems upgrades. Some or all of the C-130Es were stored in the late 1980s to reduce operating costs.

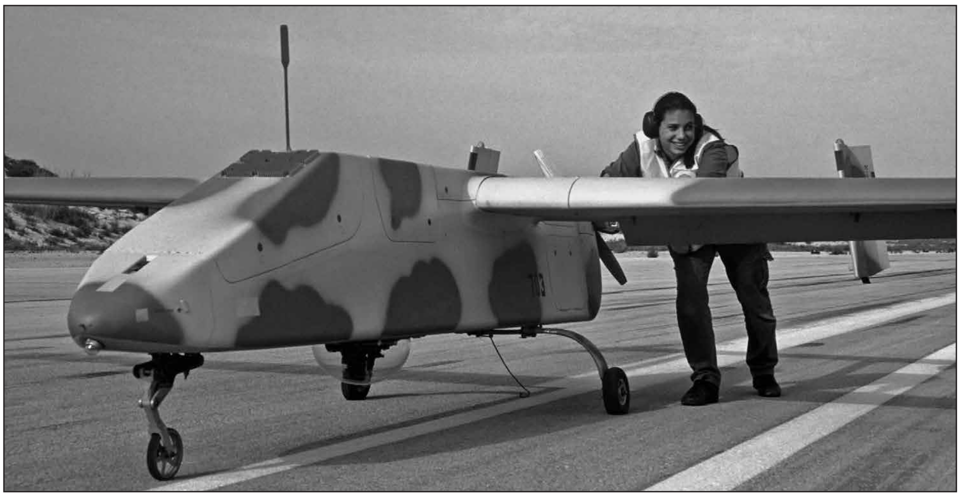
The over-worked U206s were at last replaced with TB20 Trinidads in 1995 to 1996, although the service had sought the more costly Bonanza. Both choices were strictly for personnel transport. The IAF also took on six Bell 206L Long Ranger III



Another aircraft with respectable endurance that the IAF wished to extend further in the run-up to the 1991 Gulf War was the E-2C. With just four aircraft, getting more from the small fleet was the motivation for adding an AR probe to initially just one, then another later. Aircraft 941 has the 192 Squadron badge on the nose. It is refueling from a KC-130 in 1993. (Ofer Zidon Collection)



For larger capacity helicopter liaison, the IAF chose the Bell 206L Long Ranger. However, only six of these helicopters were purchased in 1984 and then sold off in 2003 owing to budget cuts. This machine is likely at Sde Dov AB and bearing the marks of 125 Squadron. The added antennas suggest roles beyond basic transport. (Ofer Zidon Collection)



The evolution of the mini-UAV from the Scout was to a marginally larger airframe and more powerful engine for greater fuel and payload. The Searcher, seen here, was further upgraded to the Searcher II and these systems served for more than a decade. The hook below the vehicle indicates the landing stop means via snagging an arrestment wire. (IDF Spokesperson via Ofer Zidon)

helicopters to supplement the existing Bell liaison fleet. Beech Super King Air B200s were acquired for high-capacity personnel transport on a more economical scale than the Westwinds that were sold and the old Queen Air fleet drawn down. The Beeches, which also performed communications relay duties, allowed the elderly Do.27s to be parked and the 28s to begin their phase-out. The three Aravas leased for Operation Peace for Galilee were purchased and served as inexpensive paratroop training jump airplanes. Four C-47s were still flying at the end of the century, although the Air Force wanted to go with turboprops for all such medium transports as soon as possible.

Swap of an uprated engine for the Fougas was performed in the 1970s. Nevertheless, replacing the trainers began to be considered as they approached the end of airframe life and operating costs crept up. The money could not be found and neither could a fully satisfactory substitute. Instead, the MoD accepted an IAI proposal to remanufacture and modernize the aircraft, adding 5,000 hours (about 15 years) to its service life. This was an extensive rework of the jet, at $1.3 million each, which included newly manufactured power plants from the local Bet-Shemesh Engines.

The precious fleet of photo-recce Phantoms and Kfirs continued to be operated, but they focused on strategic missions. In the first half of the 1990s, the aging Chukars and 124Is became costly to maintain and were retired when budget cuts had to be found. The mini-PRVs grew in capability to take on tactical reconnaissance, battlefield surveillance, bomb damage assessment, artillery spotting, and to support battlefield management. In 1992, the IAI Searcher, a derivative of the Scout, began to replace the earlier mini-RPVs. Payload weight was increased by about 50 percent and endurance went to 12 hours. In 1999, the IAF began purchasing the Searcher II with a more powerful engine, again boosting endurance and payload that included color and improved night imaging. These aircraft were commonly flown off paved airstrips and retrieved by snagging an arresting wire on landing. During the 1996 Lebanon operation, the Searchers provided 24-hour coverage, seeking out enemy rocket launchers and helping to adjust artillery fire.

Palmachim AB was always site of UAV development and operation. The IAF early on erected runway side stations for UAV operators to control the takeoff and landing of the air vehicles. This operator is directing the takeoff of a Hermes 450S with what is likely a hobbyist controller. The next generation of UAVs had control from inside trailers or buildings, but personnel still monitored the takeoff and landing from beside the runway. (Israeli Air Force)

The AH-64's night attack capabilities were put to unusual use in the summer of 1997 when a 113 Squadron helicopter scored its first air-to-air "kill." An Israel Aircraft Industries experimental Heron UAV had lost its command signal and went into a holding pattern over central Israel. After several hours with no apparent chance of recovery, and facing inevitable fuel exhaustion and descent, the decision was made to shoot it down over the least populous area. The aircrew located the airplane and destroyed it.

A turbojet-powered air-launched drone was created by Israel Military Industries modeled on the Chukar possessing 250-mile (402-km) range. Probably emerging in the mid-1980s, the Delilah could fly extended pre-programmed profiles, loitering until the enemy radar reacted and could then be targeted by fighter-bombers. A follow-on had radar-homing with a warhead for anti-radiation attack. Air-launched decoy work continued with Israeli coproduction of the American/Israeli TALD that followed a programmable gliding flight path as long as 78 miles (126 km). The later powered ITALD gave extended endurance or a 190-mile (306-km) flight.

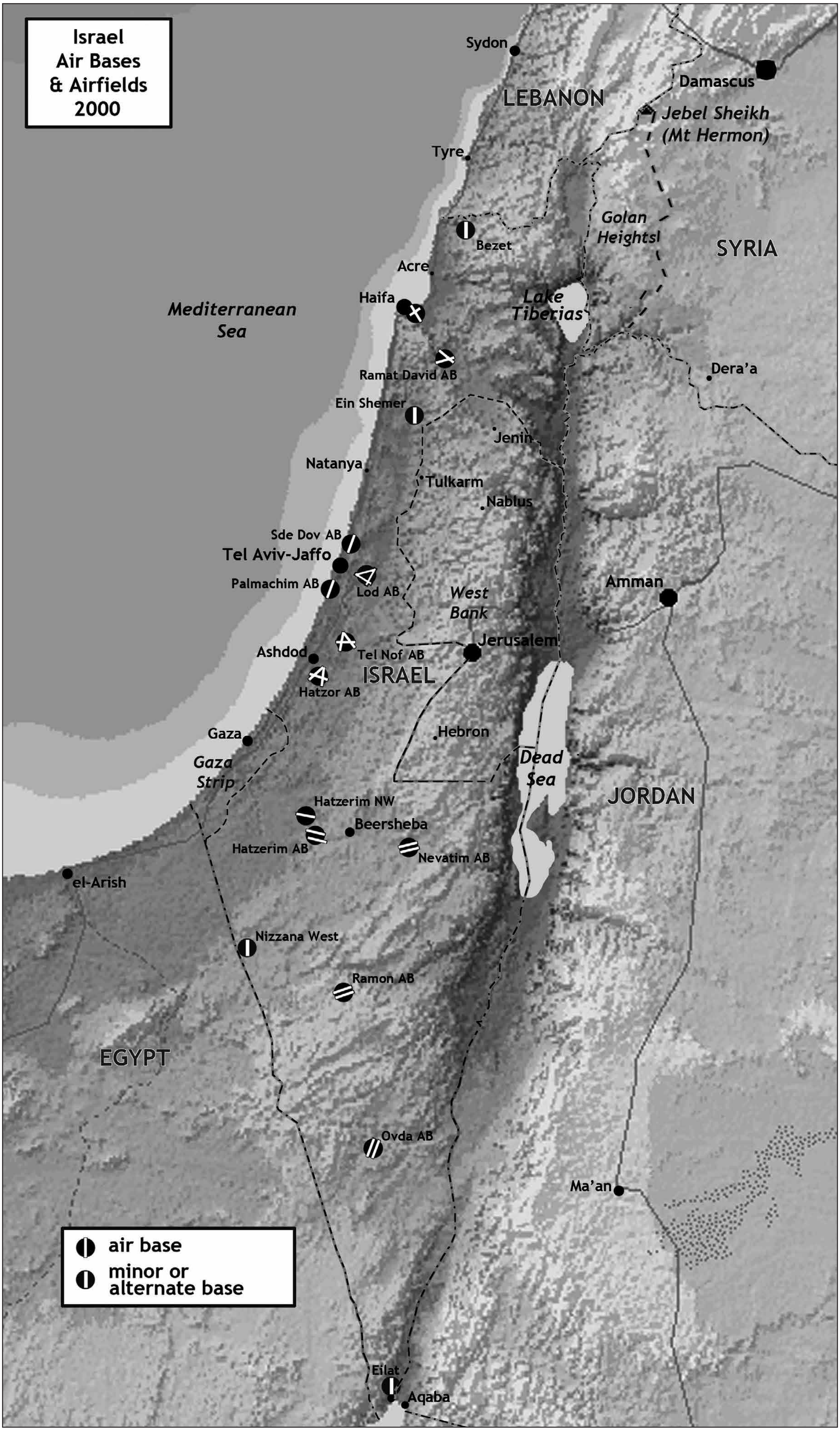
Another unmanned aircraft with a different mission was the anti-radiation IAI Harpy. This was launched from a truck- or ship-mounted container via a rocket motor after which a reciprocating engine drove a propeller for wing-borne flight. The airplane loitered awaiting a radar signal onto which to guide and so was an important SEAD weapon. The Harpy underwent changes over decades of employment by the IDF and came to be called Harop.

Satellite imagery from the USA was a valued source of intelligence. However, the Americans were not always willing to satisfy Israeli requests. Longing to obtain a "spy satellite" capability of its own, the Israeli Space Agency was established and the *Shavit* launch vehicle developed from the Jericho ballistic missile (*q.v.*). They spent a decade creating a satellite production capability. The first orbital satellite launch was in 1988, with that and a subsequent spacecraft boosted in 1990 apparently experimental platforms. The launch of *Ofeq-3* in 1995 placed into orbit a 495-lb (225-kg) reconnaissance satellite. Another launch attempt in 1998 with a more sophisticated spacecraft failed when the booster exploded. The Shavit was launched from Palmachim AB with satellites augmenting IAF capabilities. Operational control of these satellites was probably the responsibility of the Air Force. In 1999, the service established a Space Branch within the Development Department of the Materiel's Group. The IAF commanders endorsed such exploitation of space, one seeing the possibility of replacing "three squadrons of intelligence-gathering aircraft" with on-orbit systems.

By 2000, the IAF's ORBAT (some data in table best estimates) had the most rational content since its creation, having reduced the number of types by a quarter, but was still in a transitional state. Its peacetime manning was about 32,000 and its mobilized strength just 5,000 to 10,000 additional with the Air Defense Forces accounted for 70 percent of those personnel. Israel's air force was nearly as large as that of such nations as Great Britain, France, and Germany, and probably larger than Syria's. The quality of the equipment and training placed it far in advance of potential adversaries in terms of potency.

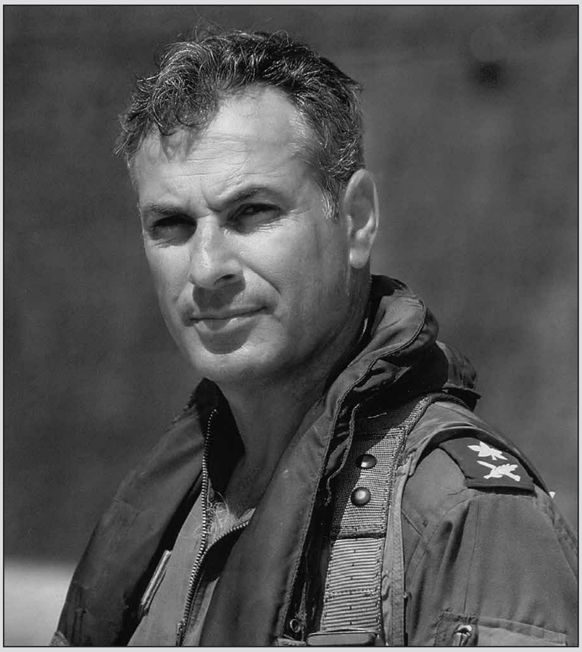
Fighter-Bomber
87 F-15 (including 35 A, 6 B, 16 C, 5 D, 25 I)
231 F-16 (including 89 A, 16 B, 77 C, 49 D)
50 Kurnass 2000 remanufactured F-4E
30 F-4E
(70) F-4E stored
60 A-4N
(90) A-4N stored
(120) Kfir stored (including C2, C7, TC2)
Attack Helicopter
58 AH-1F modified (many earlier models converted)
41 AH-64A
Electronic Warfare
6 Boeing 707 ELINT, COMINT, EW, AEW, C^3
2 EC-130H ELINT and ECM
7 Arava 202
7 RC-12 (5 RC-12D, 2 RC-12K)
(4) C-47 stored
(4) E-2C AEW stored
Maritime Patrol
3 Sea Scan
Reconnaissance/Surveillance
11 RF-4E
3 F-4E(S)
20 Searcher and Searcher II RPVs (losses continuously replaced)
Aerial Refueling
4 Boeing 707 (boom or combined boom and hose-drogue)
3 KC-130H (hose-drogue)
Transport
5 Boeing 707 cargo/personnel, VIP, hospital
13 C-130E/H
(6) C-130E stored
5 Super King Air B200
2 Arava 101
4 C-47
22 Trinidad
12 Do.28
Transport Helicopter
25 Yas'ur 2000 (upgraded S-65 and various models of CH-53)
25 S-70/UH-60 (10 UH-60A, 15 UH-60L)
24 Bell 212
17 Bell 206A/B, OH-58
6 Bell 206L
Maritime Helicopter
5 AS.565MA
Training
27 TA-4H/J
43 Tzukit (remanufactured Magister, 30 stored)
16 Super Cub
4 Queen Air
10 Bell 206/OH-58
10 Bell 212
12 AH-1E
Ballistic Missile
50-100 Jericho IIb
910 total aircraft (excluding stored)

Ein Shemer	
UAV School	Scout
Haifa (Wing 21)	
--	Bell 212 detachment
Hatzerim (Wing 6)	
69 Hammers	F-15I
102 Flying Tiger	A-4N, TA-4 (dual advanced training and attack mission)
107 Knights of the Orange Tail	F-4E
123 Southern Bells	Bell 212
Flying School	Tzukit, Queen Air, Cub, Bell 206/OH-58, Bell 212, AH-1E
Hatzor (Wing 4)	
101 First Fighter	F-16C/D
105 Scorpion	F-16C/D
Lod (Base 27)	
120 International	Boeing 707, Maritime Surveillance Flight – Sea Scan
122 Dakota	C-47, Arava
103/131 Yellow Bird	C-130, KC-130 (joint squadron operating a pool of aircraft)
Nevatim (Wing 28)	
116 Flying Wing	A-4N
Ovda (Wing 10)	
144 Phoenix	F-16A/B
Palmachim (Wing 30)	
124 Rolling Sword	UH-60
160 Southern Cobra	AH-1F
161 Northern Cobra	AH-1F
193 Naval Helicopters	AS.565MA
200 UAV	Searcher
Ramat David (Wing 1)	
109 Valley	F-16D
110 Knights of the North	F-16C
117 First Jets	F-16C
Ramon (Wing 25)	
113 Hornet	AH-64A
140 Golden Eagle	F-16A/B
190 Magic Touch	AH-64A
253 Negev	F-16A/B
Sde Dov (Wing 15)	
100 Flying Camel	King Air, Do.28
125 Light Helicopters	Bell 206/OH-58, 206L
135 Light Transport	RC-12, Trinidad, Queen Air
Sdot Micha (Wing 2)	
150 (unverified)	Jericho IIb
Tel Nof (Wing 8)	
106 Spearhead	F-15C/D
114 Heavy Lift	Yas'ur 2000
118 Night Birds of Prey	Yas'ur 2000
119 Bat	Kurnass 2000, RF-4, F-4E(S)
133 Twin Tail	F-15A/B
201 The One	Kurnass 2000, RF-4E
601 MANAT (Flight Test Center)	F-4E, F-15, F-16, Tzukit
669 Aeromedical Evacuation Unit	on-call CH-53, UH-60, Bell 212, C-130


Israel
Air Bases
& Airfields
2000
Sydon
Damascus
LEBANON
Jebel Sheikh
(Mt Hermon)
Tyre
Golan
Heights
SYRIA
Bezet
Acre
Haifa
Lake
Tiberias
Mediterranean
Sea
Ramat David AB
Dera'a
Ein Shemer
Jenin
Natanya
Tulkarm
Nablus
Sde Dov AB
Tel Aviv-Jaffo
Palmachim AB
Lod AB
West
Bank
Amman
Jerusalem
Ashdod
Tel Nof AB
ISRAEL
Hatzor AB
Gaza
Hebron
Dead
Sea
Gaza
Strip
JORDAN
Hatzerim NW
Beersheba
Hatzerim AB
Nevatim AB
el-Arish
Nizzana West
Ramon AB
EGYPT
Ovda AB
Ma'an
air base
minor or
alternate base
Eilat
Aqaba

By 2000, Israeli air bases consisted of those depicted here. Ovda was then little used. (Tom Cooper)

11th Commander – Avihu Ben-Nun entered the military in 1957 and was selected for pilot training. From 1961 he served two years as a flight instructor before becoming a Mirage pilot at Hatzor AB. Ben-Nun helped to establish 119 Squadron at Tel Nof, but took a deputy CO job at 116 on Mystère IVAs where he flew during the Six-Day War. He assumed command during the war when his CO had to abandon his aircraft during combat. After the war, he went back to 119 as commander. He was selected to bring the F-4E into the force and commanded 69 Squadron on its formation and throughout the challenging War of Attrition. He claimed two kills in each of the Mirage and Phantom. In 1970, he moved to head the Attack Branch at headquarters where he remained during the Yom Kippur War. Following a year studying in America, he returned to lead the Operations Department. Between 1977 and 1982, he commanded the Hatzor and Tel Nof wings. Back at the AHQ, he headed up the Air Group and then the headquarters itself. Following another year of study, Ben-Nun was appointed to lead the Planning Branch on the General Staff before being selected as Air Force CO in September 1987. He had to make cuts to remain within a straining budget, but managed this without compromising essential operational capabilities. He grew the attack helicopter force by bringing in the Apache and oversaw the emotional airlift of Ethiopian Jews while also preparing for action during Iraq's attacks during Desert Storm.

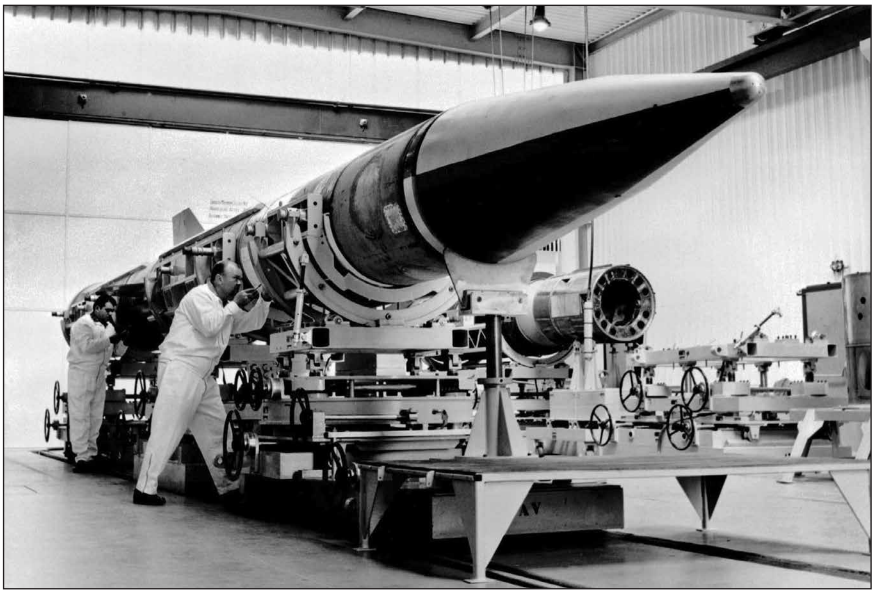

Major-General Avihu Ben-Nun served as Israeli Air Force CO from September 1987 through January 1992. (Ofer Zidon Collection)

Unmentionables

Israel is widely reported to have possessed an undeclared nuclear weapon capability since the late 1960s or early 1970s. Ballistic missiles to deliver such weapons were also developed. Details of these systems and the extent of their capabilities remain wrapped in deep secrecy and likely misinformation for deterrent purposes. Consequently, information cannot be confirmed by conventional research.[30] Developed by the State, the Air Force has been responsible for the operation of these systems.

France and Israel had worked jointly on nuclear research since the mid-1950s, and the former was principally responsible for the design and construction of the large reactor and nuclear research facility at Dimona, in the Negev desert. This served French interest in its development of an independent nuclear weapon capability in the face of American reticence on some topics. The Israeli weapons began as aircraft-delivered bombs and later artillery shells. Employment of such devices in nearby states would have had devastating environmental consequences affecting Israel as well, and so were true "doomsday" weapons. The more practical delivery was via ballistic missile that Israel had worked to develop since the 1950s. They finally contracted with Dassault in 1962 for development of the MD-620 missile. Here, again, the program suited French desire to grow its missile industries in the face of jaded assistance from the USA and Britain, and given potential Israeli contributions to the endeavor.

The MD-620 was a two-stage, solid fuel rocket of roughly 10,000-lb (4,500-kg) possessing 300 miles (500 km) range with a 1,100 to 1,655-lb (500 to 750-kg) warhead and perhaps an accuracy of 0.6-mile (1-km) circular error probability of impacting a target using inertial guidance. A dozen or so missiles were delivered before the French break with the Israelis. Israel Aircraft Industries then continued development with test shots from Palmachim. Production as the Jericho ran through 1980. The missiles were carried on wheeled transporter-erector-launchers (TEL) that were


Before the Six-Day War, the Israelis contracted with Dassault for development of a two-stage, solid propellant, ballistic missile called the Jericho on a transporter-erector-launcher, shown here. Israel Aircraft Industries subsequently brought it to series production and it was deployed in underground shelters. In the decades that followed, this was upgraded and manufactured as the Jericho IIb and the three-stage Jericho III, all presumed to be armed with nuclear warheads. (Dassault via Albert Grandolini)

sheltered in tunnels at a base near Jerusalem identified as Sdot Micha Air Base (Wing 2), very close to Tel Nof at a place called Hirbat Zachariah. Perhaps 50 to 100 weapons were fielded, most of these likely for reload.

Israel had sought the Pershing II missile from the USA during negotiations for evacuation of the Sinai under the peace treaty with Egypt. This was rejected and so the Jericho was upgraded to the Jericho IIb, in cooperation with South Africa, with fielding in about 1990. This was a similar, but more capable, rocket of perhaps 48,360-lb (21,936-kg) launch weight with a 2,200-lb (1,000-kg) warhead and 465-900 miles (750-1,500-km) range with possible radar terminal guidance in the detaching warhead. Again, it is suspected that 50 to 100 missiles were deployed. It was this rocket that was the basis for the first Shavit space launch vehicle. The Jericho III was a further development, possibly using technology of the Shavit II launcher with a third stage. Possessing an estimated 4,800-6,500-mile (2,982-4,038-km) range, this missile was likely deployed in about 2011. Tests in 2019 of a new rocket motor was suspected to be associated with a Jericho IIIA.

These weapons, never formally acknowledged, served as a deterrent to some. Even given their existence and the presumed ability to hit such targets as rumored Iranian buried nuclear weapon development facilities with acceptable accuracy, Israeli leadership felt reasonably constrained and continued to rely on the IAF aircraft as its strategic strike arm.

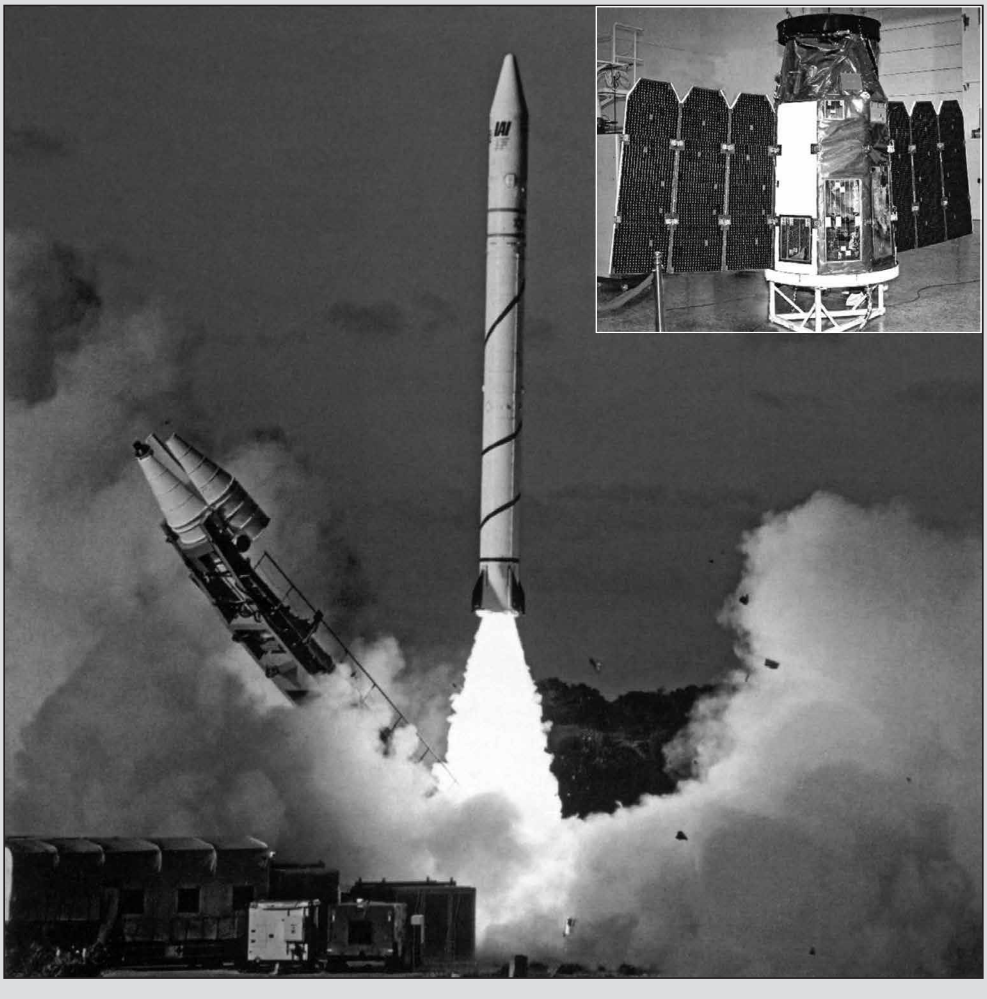
Afar

In the nearly two decades following the summer of 1982, there were no major military engagements between Israel and surrounding countries. The last aerial combat to date of writing was in 1985. This long lapse, greater than any in Israel's history, illustrates the changing defense posture in the region. However, Zahal continued to prepare for the worse with the Yom Kippur War failings guiding decisions.

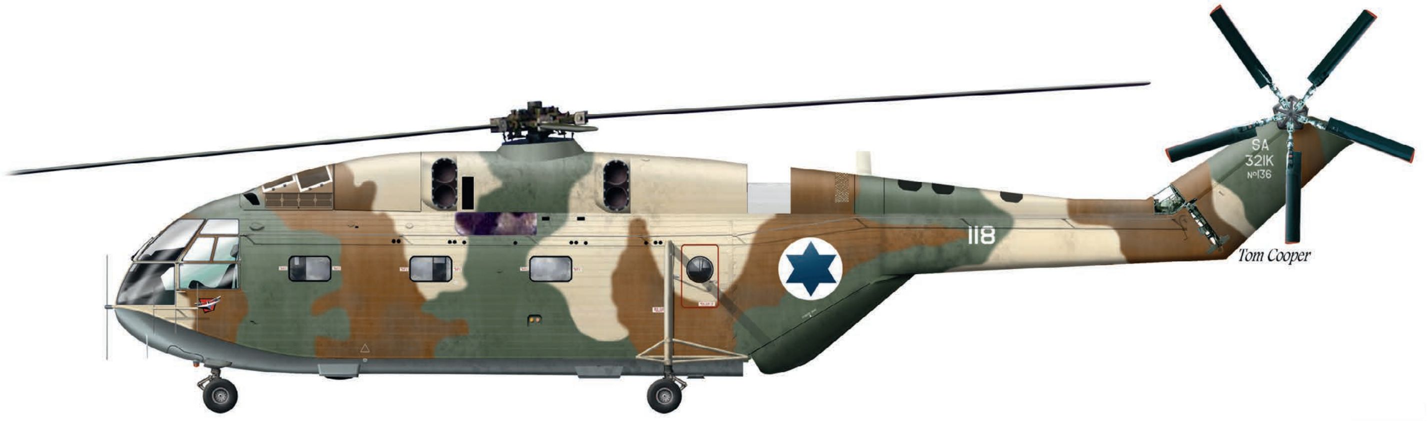
While Syria chose not to challenge Israel militarily, the contest with Hezbollah in southern Lebanon continued. Small unit actions, shelling, and airstrikes were common and sometimes heavy. This appeared an indefinite commitment as no military solution was in the offing. Syria's open interference with the mission ebbed, though it and Iran continued to arm Hezbollah. Evolving Air Force resources permitted strikes to be carried out with greater precision for lower collateral damage. The Apaches especially permitted effective night attacks.

Acquisition of late-model F-15s and F-16s, plus aerial refueling assets, provided the potential for extending the IAF's reach to confront threats beyond the bordering states. This offered the government extraordinary military solutions, but also the potential for significant international repercussions and aircrew falling into the hands of law-enforcement or hostile actors. Many contingencies were explored and training performed, but only one operation was executed through 2000.

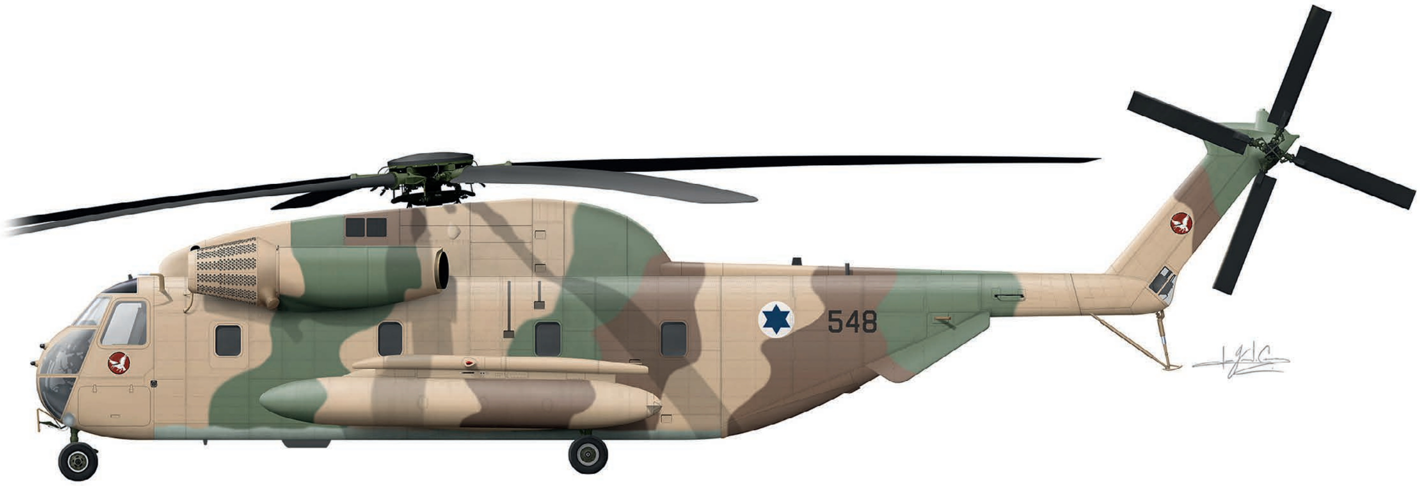
The first launch of a Shavit from the Palmachim test range occurred on September 19, 1988, and carried aloft the Ofeq-1 scientific experimental satellite. With this, Israel became only the eighth nation to orbit an artificial satellite. However, Israel was about the worse placed nation to execute space launches. Forced to fire rocket westward over the Mediterranean Sea, they were launching against the rotation of the Earth in a retrograde orbit with a high inclination across the equator, allowing only a modest-sized payload.



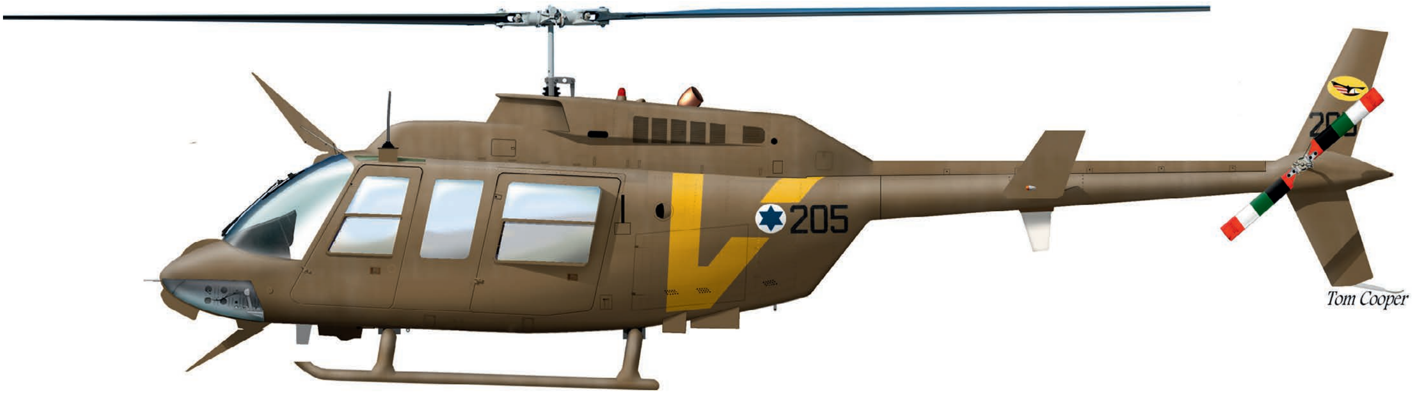
The Ofeq 3 (inset) was launched on April 5, 1995, aboard this Shavit 1 two-stage rocket at Palmachim AB. This was the first operational military observation spacecraft and many more would follow. The Shavit was based on the Jericho IIb ballistic missile and the next versions of each to emerge likely also shared technology. (Author's Collection)



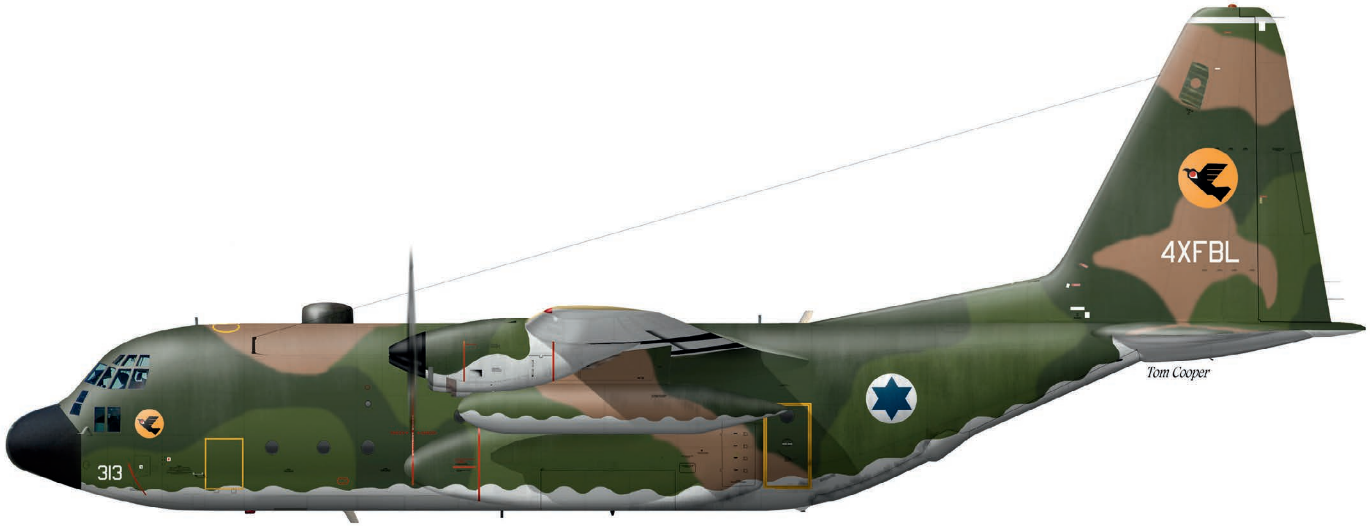
Aérospatiale SA.321K Super Frelon serial number 118, from 114 Squadron, as seen in 1974 (including the manufacturer marks and its construction number 136 on the fin). The 14 Super Frelon heavy helicopters acquired in 1966-1969 were operated until 1991. Given the French embargo, sustaining the fleet required a reengining program. The helicopters went through the usual camouflage evolution, here shown in the post-1968 scheme. Aircraft 118 (originally 018) is a SA.321Kb lacking the pontoons on the main gear struts, and with sand filters over the engine inlets above the flight deck plus recue hoist over the starboard side door. It also has the nose side antennae for the Sarah radio beacon location system to find downed aircrew survival radios. 114 Squadron operated the aircraft from Tel Nof throughout their service. (Artwork by Tom Cooper)



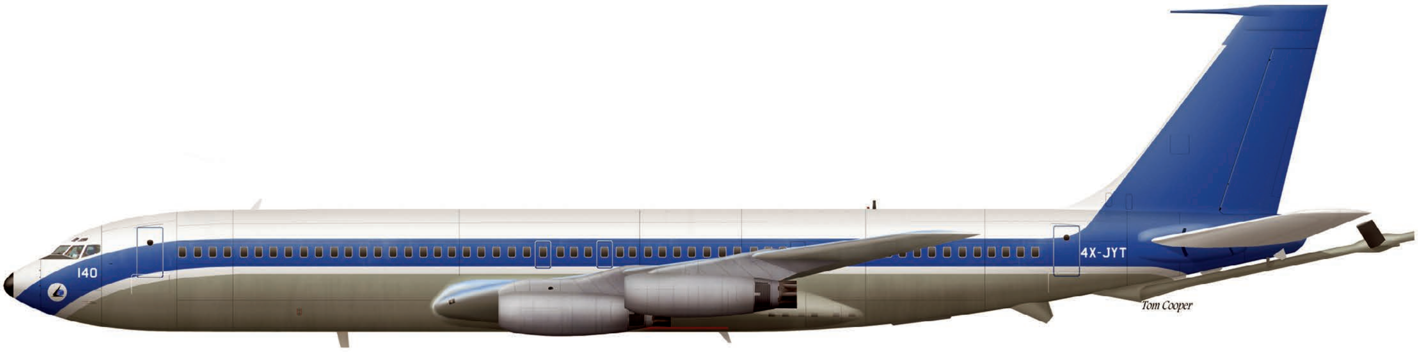
Sikorsky S-65 serial number 33, from 118 Squadron as seen in 1973. The French were not going to supply any more Super Frelons, yet the IAF wished to grow its heavy lift helicopter fleet. Fortunately, the Americans were willing to sell the Sea Stallion, though as commercial Sikorsky S-65C-3s. Arriving during the War of Attrition, they were immediately busy with commando raids, troop movements, and vertical replenishment missions. The helicopters were supplied with aerial refueling probe kits, although 118 Squadron's 33 lacks this. It is shown as it appeared in 1971, and changed little into the Yom Kippur War of 1973. (Artwork by Luca Canossa and Tom Cooper)



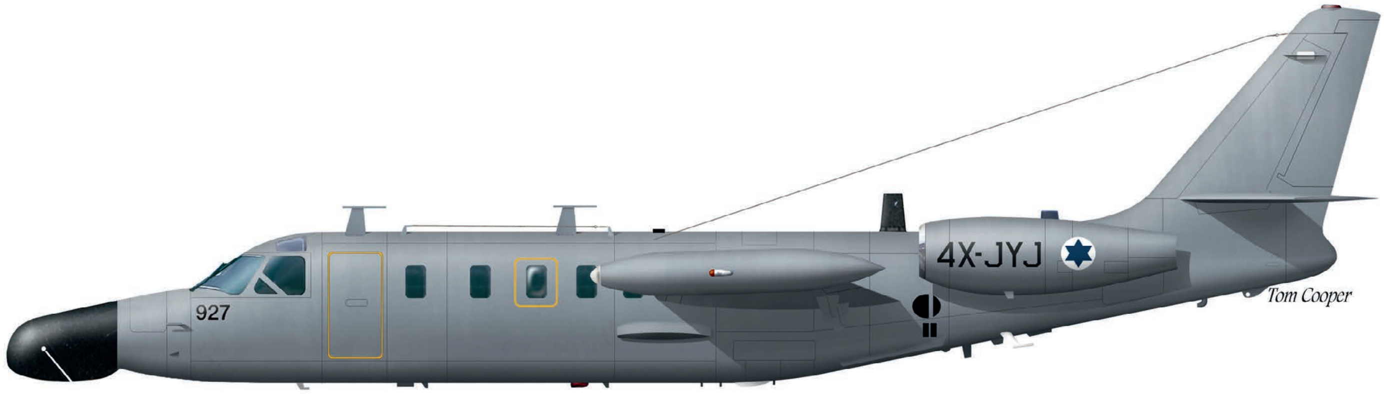
Bell 206L serial number 205, from 125 Squadron, with chevron, wire cutters, and many added warts and antennae. The Bell 206 JetRanger and OH-58 began to be acquired in 1971, with 42 ultimately taken up. A half dozen larger 206L Long Ranger choppers joined the fleet in 1984 and were operated by 125 Squadron. Aircraft 205 is depicted as it was in 1989 with wire cutters on the lower nose and upper fuselage, and the addition of various communication antennae, bulged nose battery compartment, deployable searchlight, and red beacons. Not visible are the flare tubes added to the starboard side. Also serving as trainers at the Flying School, the helicopters were sold in 2003 as a cost-cutting measure. The overall brown color with yellow chevron had been common for IAF helicopters since 1979. (Artwork by Tom Cooper)



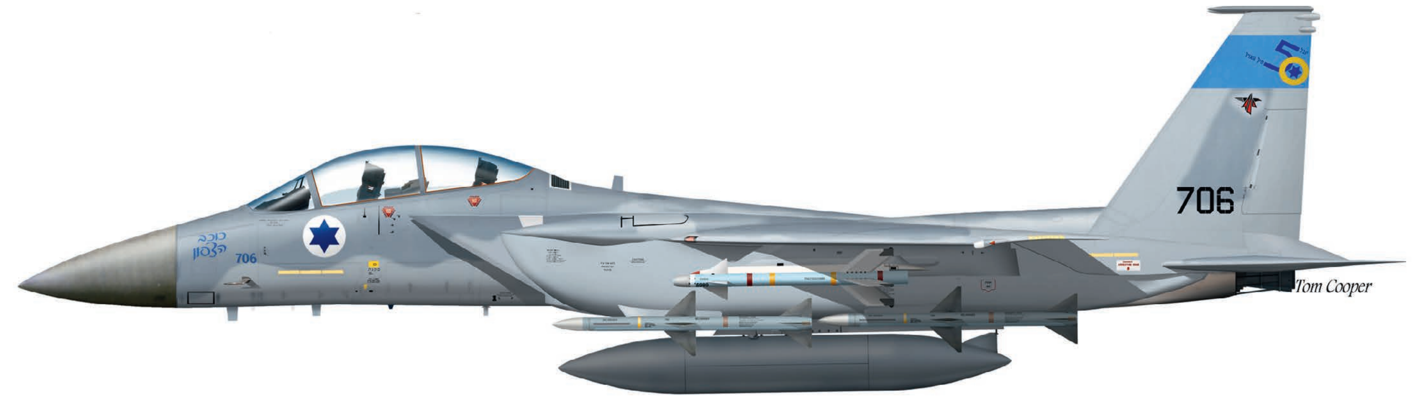
Lockheed C-130E registration 4X-FBL, serial 313, from 131 Squadron, as of 1978. The IAF began acquiring C-130Hs in 1971 and had two on force by the time of the Yom Kippur War. The Americans then supplied 12 C-130Es from active USAF squadrons. Seen in 1978, aircraft 313 was among these dozen machines and became part of 131 Squadron that was formed during the war. It has civil registration on the tail (though oddly lacking the dash after the "4X") and the squadron badge repeated on the nose. The Hercules fleet continued to expand with more current C-130Hs that persisted after the dated Es were withdrawn around the end of the century. The 4-tone camouflage remained throughout the service. (Artwork by Tom Cooper)



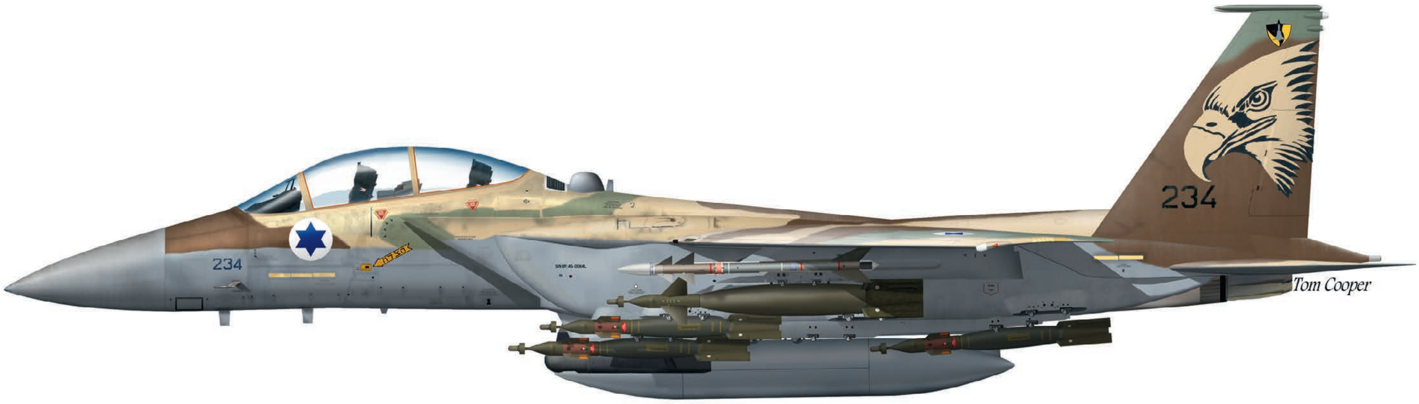
Boeing KC-707 (707-329) registration 4X-JYT/014, from 120 Squadron in white, blue and gray scheme, with squadron insignia on the nose. To create an aerial refueling capability for the receptacle-equipped fighters being acquired, the Israelis initially added KC-97 booms to Boeing 707s along with a unique boom operator remote optical system. Among the first of these tankers was this aircraft, shown as it appeared in 1985. As with most heavy transports that travel outside the country, it wears registration codes and a largely non-military finish resembling that on 707s operated by El Al, the national airlines. The squadron badge is small on the nose, although later very large on the tail. Aircraft 140 was first operated by the air force in 1978 before getting its tanker modification. It left the force in 1999. (Artwork by Luca Canossa and Tom Cooper)



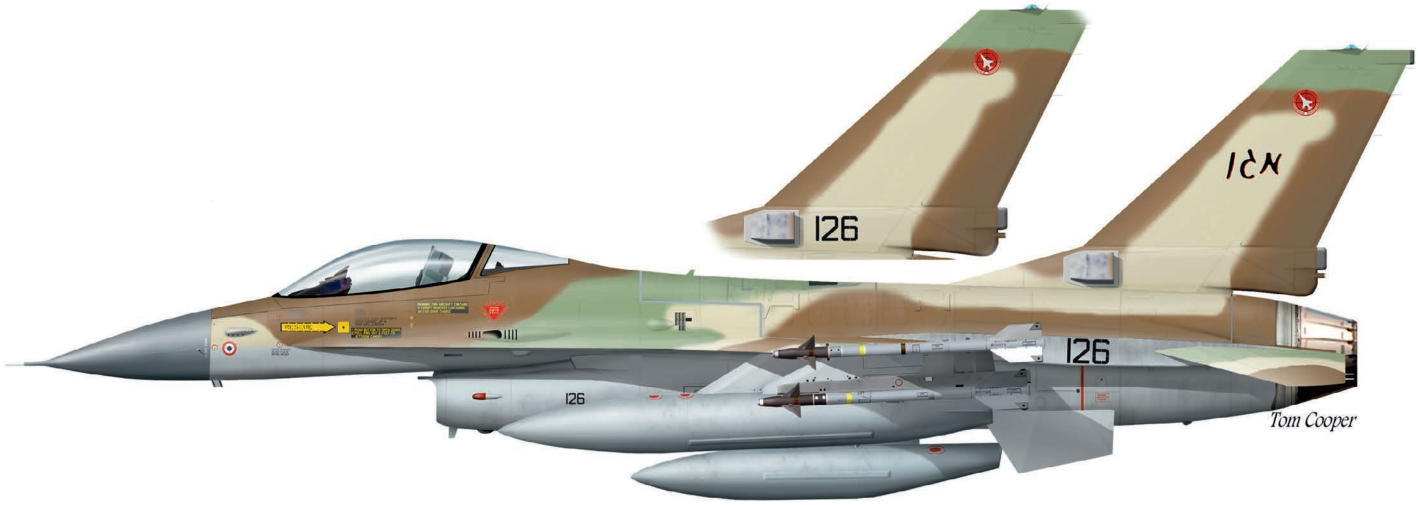
Rockwell/IAI Sea Scan registration 4X-JYJ/927, from 120 Squadron's Maritime Surveillance Flight. Terrorist incursions from the sea were met with Israeli Navy (IN) patrols and visual search from aircraft. To create a 24-hour radar surveillance capability, three Israeli Westwind corporate jets were modified with a nose sea-search radar matched with operator stations in the cabin and bulged windows for visual observation. The Sea Scan jets served from 1979 through 2017. They were operated by the Air Force for the Navy, with IN cabin personnel. They flew as a Maritime Surveillance Flight of 120 Squadron. Initially in a commercial scheme of white with blue cheat line, plus a Maritime Surveillance Flight badge, this soon gave way to an overall gray, usually with no unit markings. (Artwork by Tom Cooper)



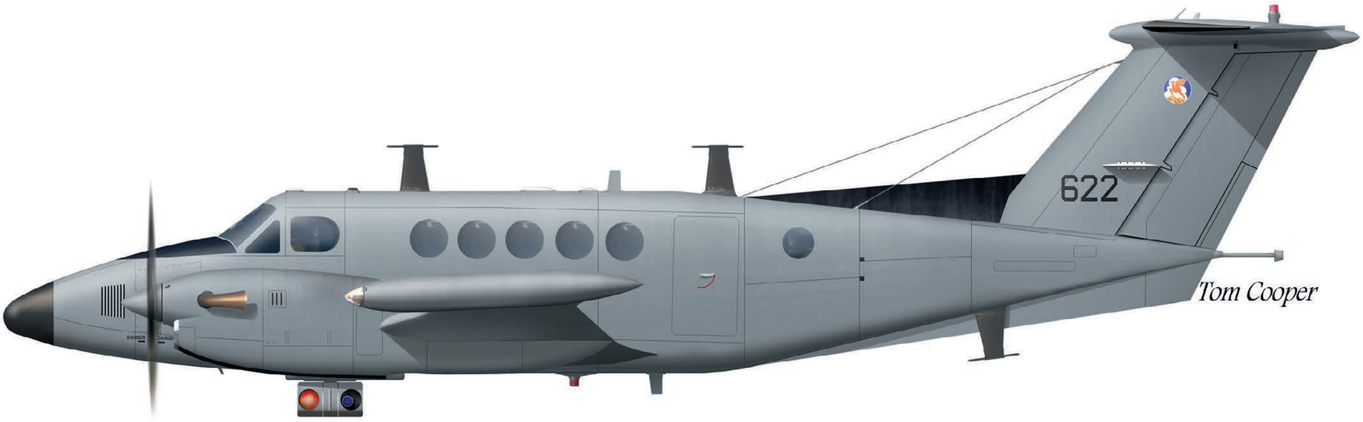
McDonnell Douglas F-15D from 106 Squadron, serial number 706, nick-named ‘Northern Star’, and wearing the 1998 50th anniversary badge on the fin, with CFTs and a centreline drop-tank, Python IIIs and AIM-7s. The Phantom had led the IAF to see the value in dual-seat combat aircraft, and so sought two-seat F-15s with several batches of F-15Ds acquired. An aircraft like this carried out the 1985 raid on Palestinian Liberation Organization headquarters in Tunis, although a GBU-15 guided bomb replaced the port underwing tank and a datalink pod replaced the centerline tank. (Artwork by Tom Cooper)



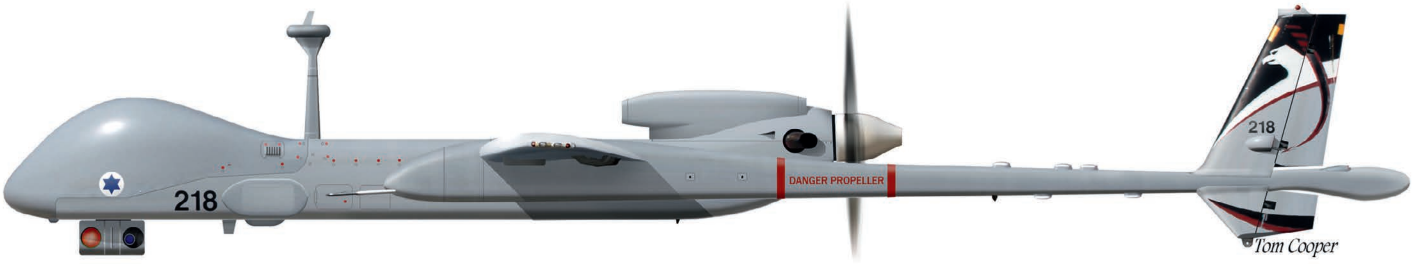
Boeing F-15I serial number 234, from 69 Squadron, with full LANTIRN equipment, GBU-49 and GBU-10 (main underwing pylon) laser-guided bombs, and a SATCOM antenna. The 25 F-15Is that arrived from 1998 were important for heavy weapon delivery with precision delivery systems matched to low-level and night operations. The jets were operated by 69 Squadron from Hatzerim and came in the same camouflage colors applied to F-16s. This scheme and routine markings were used until 2003 when a large eagle head motif appeared within the tail paint pattern. Aircraft 234 displays these markings and is equipped with a heavy load of weapons and a LANTIRN pod. Satellite communications capabilities were introduced in 2005, evidenced by the dark antenna fairing just aft of the canopy. (Artwork by Tom Cooper)



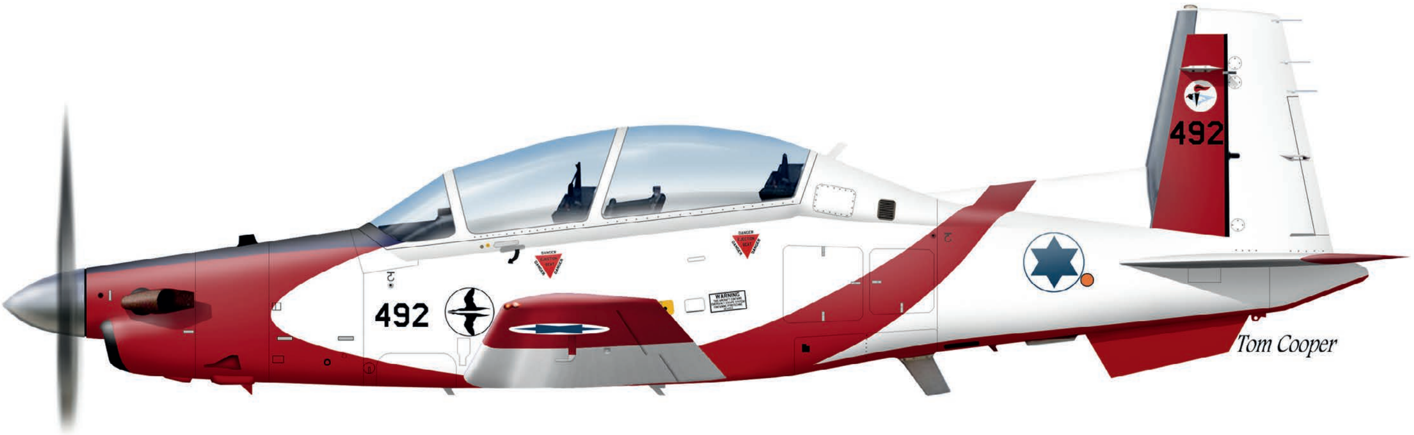
General Dynamics F-16A serial 126, as of 1989, with one Syrian kill, number on the vertical tail island, a flare/chaff dispenser on the base of the fin, centerline tank and wing, and AIM-9L Sidewinders. The insert shows an alternate aircraft code location. The new F-16As and Bs arrived during 1980 in a new IAF paint scheme, and they had individual aircraft names on the tail. The aircraft serial was moved from the vertical surface between the wing and tail to the vertical tail island before taking up the common location on the tail. A flare/chaff dispenser was soon added to the island as well. Depicted is 117 Squadron’s 126 “Defender” with a single kill earned over Lebanon in April 1981; the downing a Syrian Mi-8 helicopter with a Sidewinder. These early F-16s served until 2016 when they were retired to save on operating expenses and because of the diminishing threat. (Artwork by Tom Cooper)



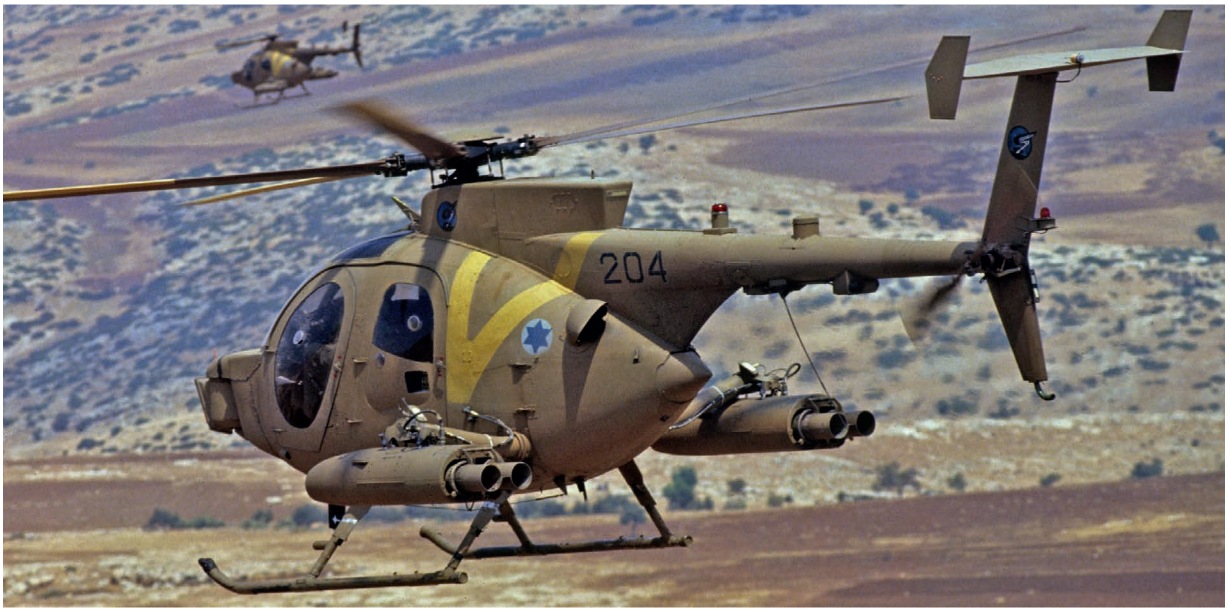
Beechcraft Super King Air serial number 622, from 100 Squadron, with tip tanks. The IAF began operating the Super King Airs in 1985 in the form of RC-12 electronic warfare aircraft. The B200 transports began to be used in 1990, and over the years were adapted to various roles. Aircraft 622 is shown as it appeared in 2012 with numerous additional antennae for radio relay or flying command post missions. It has also been fitted with an electro-optical turret on its belly to monitor surface activity over land or sea. This began to appear in the early 2000s. It could respond more quickly than UAVs, the onboard operator providing verbal input as well as image downlink. (Artwork by Tom Cooper)



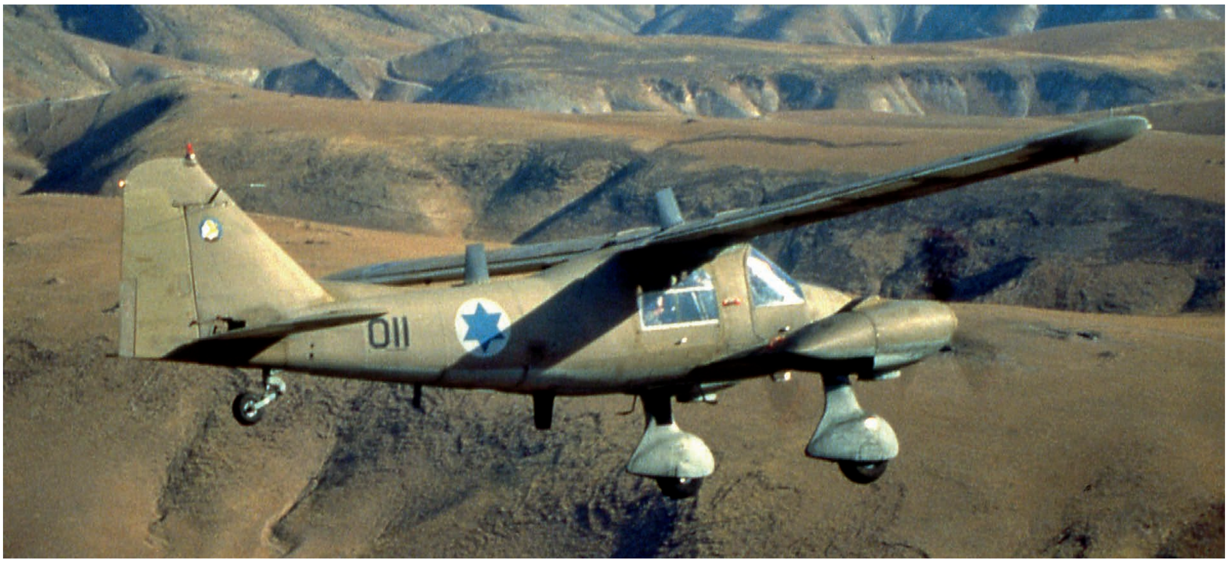
IAI Heron TP serial number 218, from 210 Squadron, the EO turret rotated for flight. Photo reconnaissance was always important to the Israelis, and the anti-aircraft threat drove the adoption of unmanned air vehicles. With the need for persistent observation for anti-terror operations, small UAVs were also introduced. The Israelis became a world leader in such systems, and the vehicles grew in size and complexity, plus offering greater performance. The pinnacle of this evolution appeared in 2010 with the Heron TP, named Eitan by the IASF. A new squadron was formed to operate the type that was integrated into manned aviation operations at Tel Nof. Aircraft 218 displays the 210 Squadron tail art and the national marking on the forward fuselage that was always applied. (Artwork by Tom Cooper)



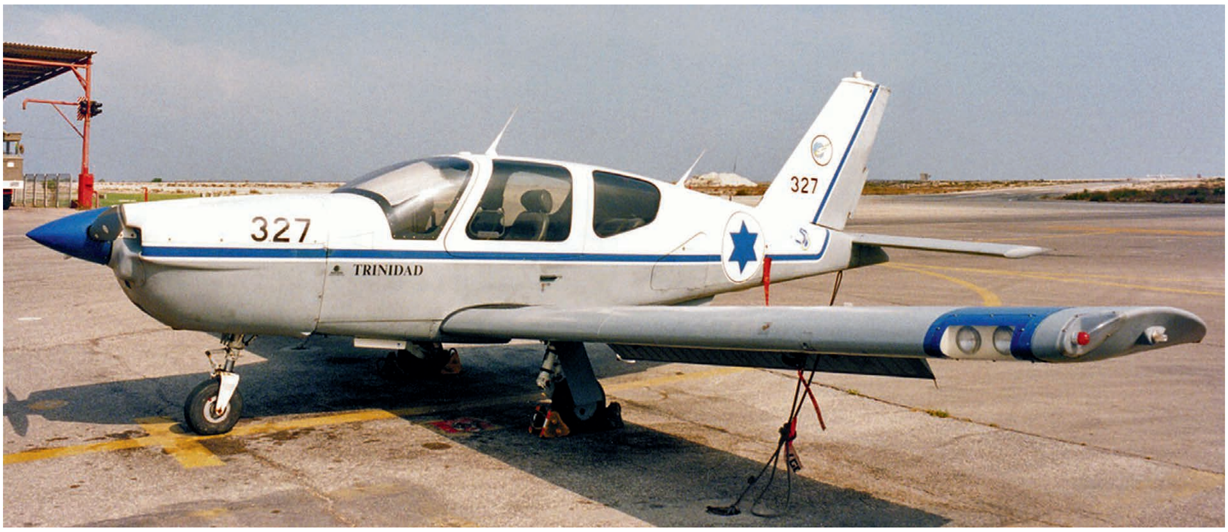
Beechcraft T-6A Texan II serial number 492, from the Air Force Academy and the aerobatic team, as seen in 2017. Long seeking a replacement for the Fouga Magister trainer, the Air Force compromised with an economical turboprop. The 20 T-6A Texan IIs were maintained under contract and adopted the usual Israeli red and white training colors. Aircraft 492 shows the placement of the markings, to include the Air Force Academy insignia on the tail (originally Flying School). Carrying on the tradition from the Magisters, the aerobatic team employs the aircraft for the occasional aerial display. When so operated, the team emblem is applied to the forward fuselage as shown, red prior to the mid-1980s. (Artwork by Tom Cooper)



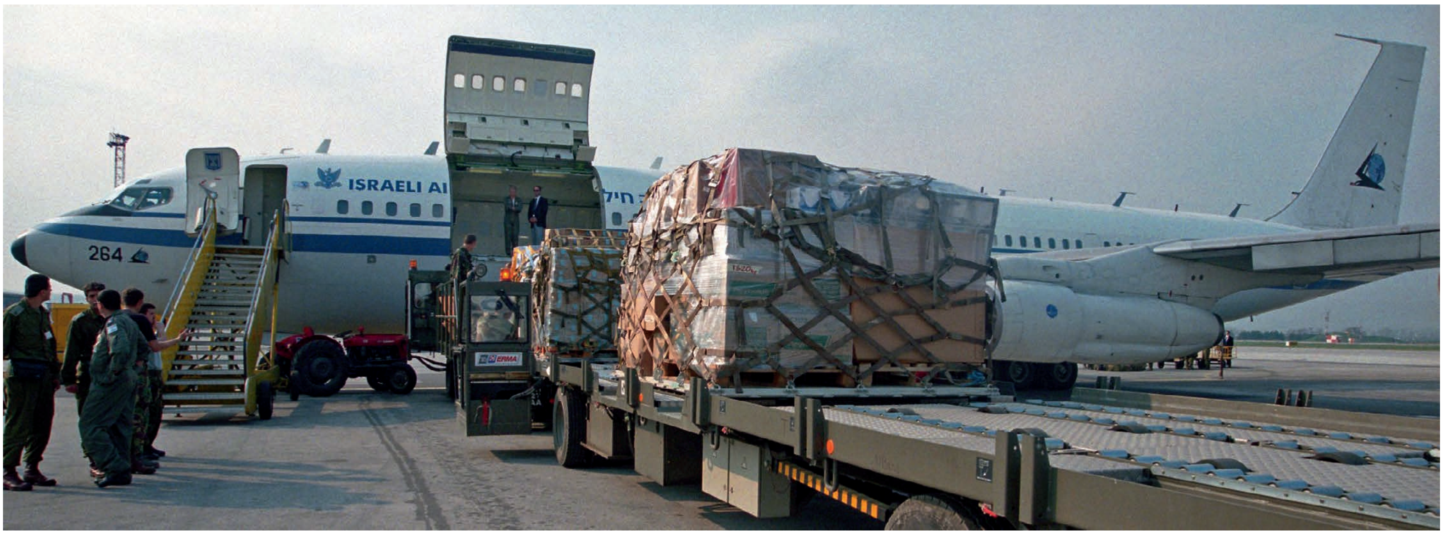
The Hughes 500MD supplemented the Cobra force at less cost, but also less firepower. These helicopters were initially mixed in with the Cobras until a separate squadron was formed. This image from beyond 1985 shows the 190 Squadron badge. (IAF Magazine via Ofer Zidon)



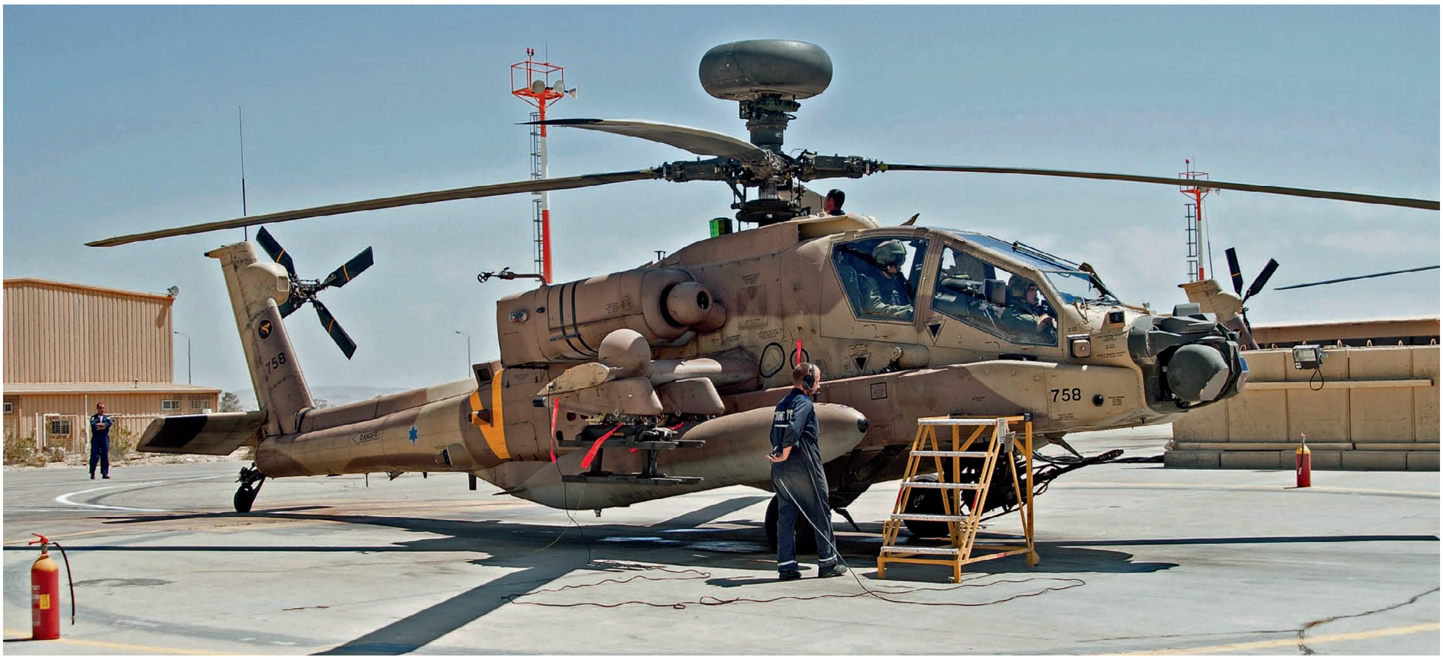
Apart from light utility transportation, the Do.28 was employed in observation along the borders, the coastline, and the occupied territories. It was also used for twin-engine training. This 100 Squadron Do.28 shows a goodly number of additional antennas suggesting a radio relay and field commander observation role. (Ra'anan Weiss Collection)



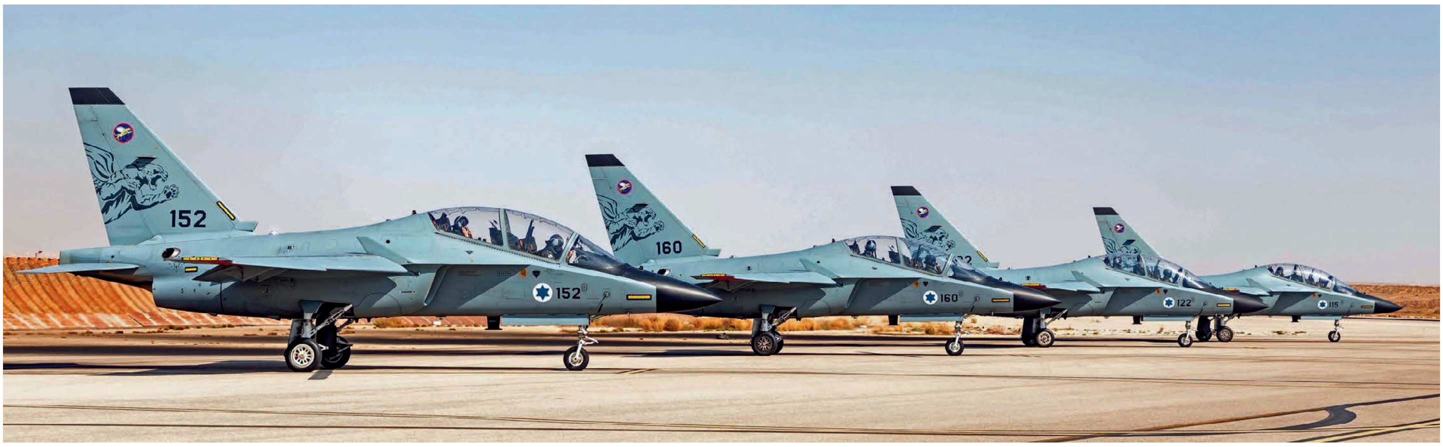
The Israelis went with a French airplane again when replacing their light liaison machines in the 1990s. However, the SOCATA Trinidads did not prove popular and had a relatively brief service of just 10 years. This example, probably at Sde Dov, displays the 135 Squadron badge on the tail. (Amos Dor Collection)



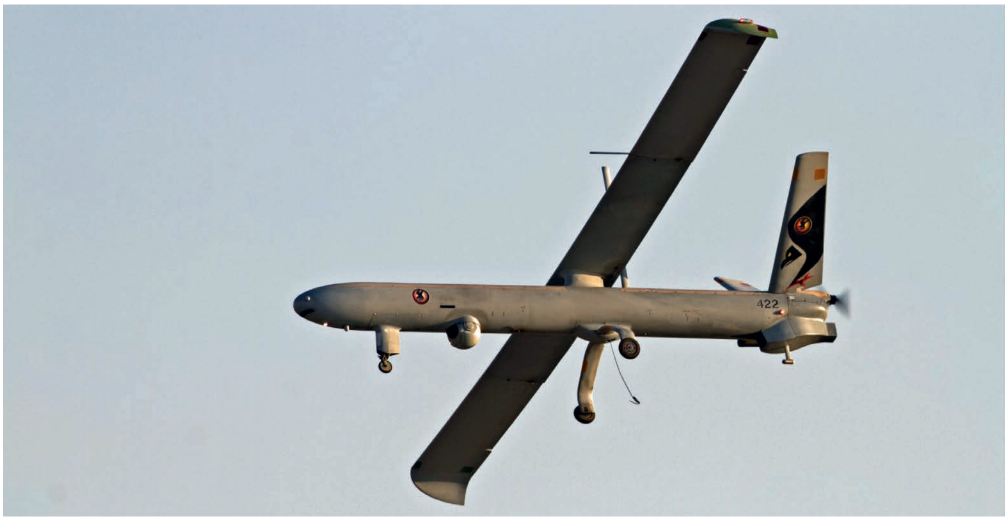
As Israel became a comparatively wealthy country with a desire to help others, it showed its compassionate side, despite bad press about occupied lands and bombing Palestinians, by having its air force conduct disaster relief operations. Particularly the 707 fleet was seen in foreign lands displaying the Israeli flag. Aircraft 264 of 120 Squadron, with the cargo door conversion, is painted with the IAF logo, in this case using "Israeli" instead of the more common "Israel." (IDF Spokesperson via Ofer Zidon)



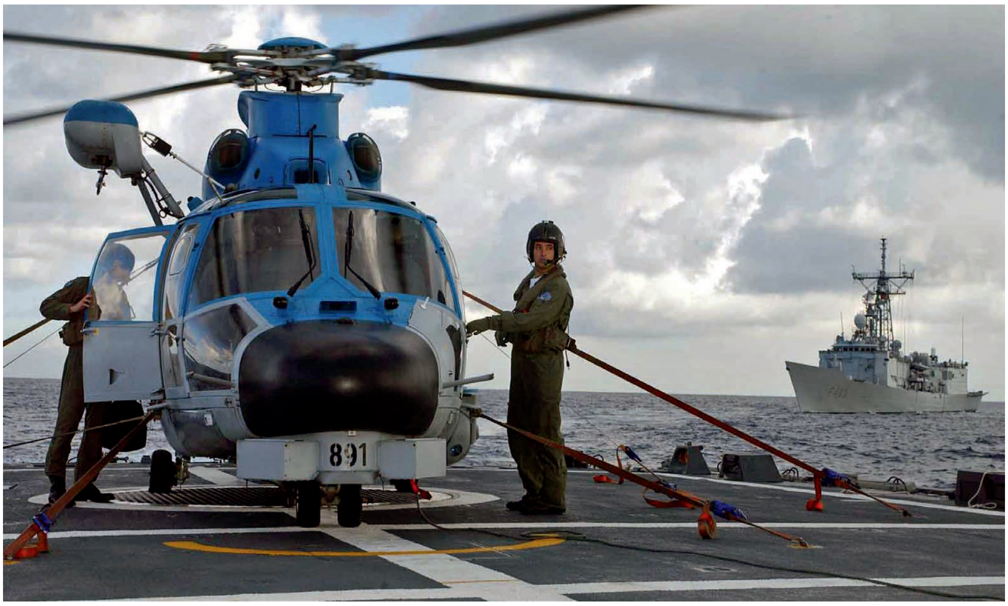
This 113 Squadron AH-64D, with Longbow fire control radar dome atop the mast, prepares to launch at Ramon AB. It has undergone all the upgrades including SATCOM antenna dome, and Israeli self-defense installations included added flare/chaff dispensers. Hence, it has grown many "warts" and is atypical of Apaches operated by others in the world. (Ra'anan Weiss Collection)



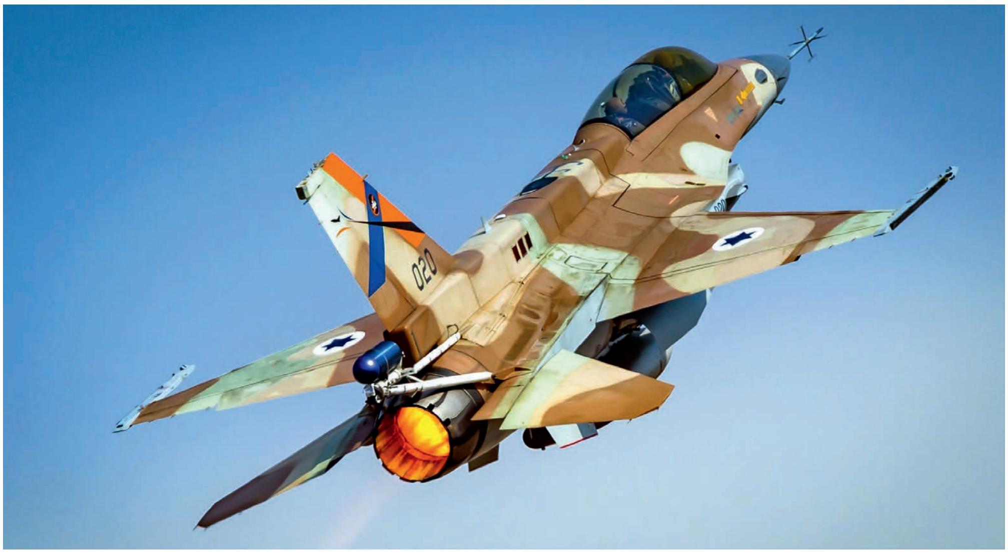
Advanced flight training and fighter lead-in training was taken over by the Alenia Aermacchi M-346 in 2014. Thirty of the Italian airplanes were purchased and operated from Hatzerim AB. They wear the markings of 102 Squadron where they displaced TA-4s. (Israeli Air Force)



With the new century came the Hermes 450S with more capable sensors, higher altitude operation, and endurance of a full day. The air vehicle displays the markings for 161 Squadron and the mount points for the underwing pylons are evident. This UAV is credited with delivering air-to-surface missiles. (Ofer Zidon Collection)

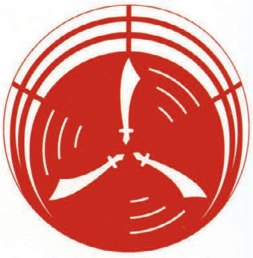


Finally getting maritime helicopters, the Israel Navy took delivery of seven Panthers between 1996 and 1997, with modifications adding search radar and FLIR plus self-defense systems. Aircraft 891, with rotors turning, is secured to the deck of a Sa'ar 5 corvette. (Ofer Zidon Collection)

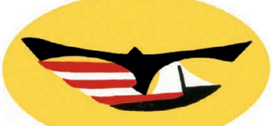


The Israeli predilection for altering foreign-purchased aircraft to meet their specific needs compelled growth of a routine maintenance flight activity into a flight test unit. At Tel Nof AB from its inception, this grew to a world-class capability with foreign-trained test pilots and flight test engineers, special test equipment and technicians, and dedicated test aircraft such as this F-16I with nose boom and spin chute. (Nir Ben-Yosef Collection)

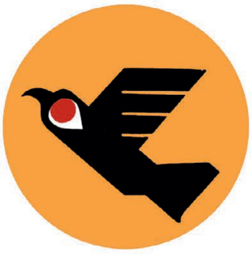
Unit Insignia, IDF/AF & IASF
1948-2020
(Part 2)



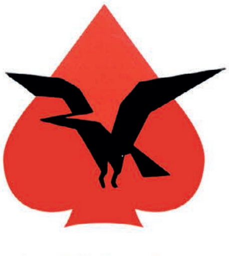
124 Squadron
Rotor and Sword/Rolling Sword
(S-58, Bell 205, Bell 212, Black Hawk)



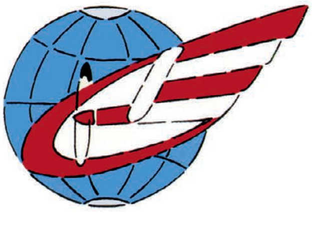
125 Squadron
Light Helicopters
(Alouette, Bell 206, Bell 206L, Bell 212, Black Hawk)



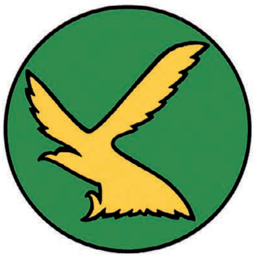
131 Squadron
Yellow Bird/Knights of the Yellow Bird
(C-130)



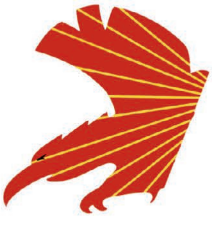
No. 133 Squadron
Twin Tail
(F-15)



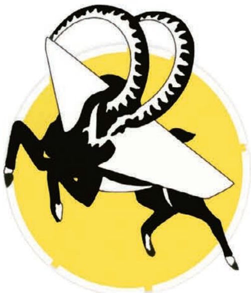
135 Squadron
Light Transport/Knights of the Air
(Cessna 180, Super Skywagon, Islander, Queen Air, Super King Air, RC-12, Trinidad, Bonanza)



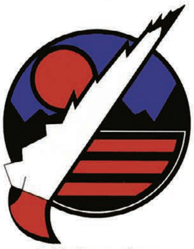
140 Squadron
Golden Eagle
(A-4, F-16, F-35I)



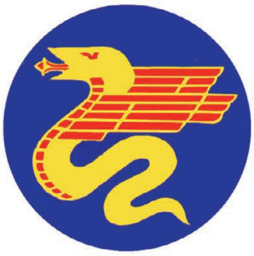
144 Squadron
Guards of the Arava/Phoenix
(Nesher, Kfir, F-16)



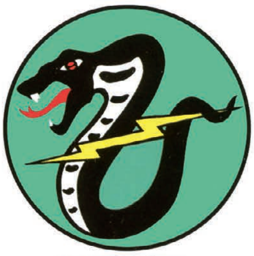
147 Squadron
Goring Ram
(A-4)



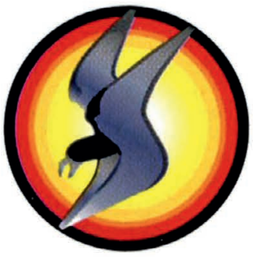
149 Squadron
Smashing Parrot
(A-4, Kfir)



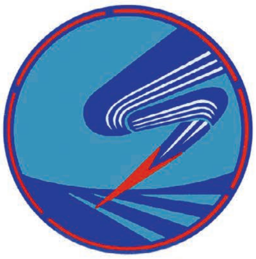
160 Squadron
Yellow Viper/Southern Cobra
(AH-1, Defender)



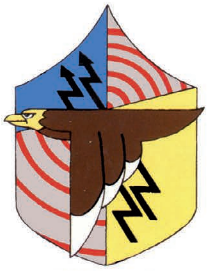
161 Squadron
Northern Cobra/Southern Cobra/ Fighting Family
(AH-1, Defender, Hermes 450S)



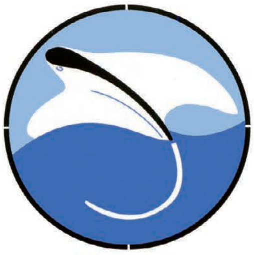
166 Squadron
The Spark
(Hermes 900)



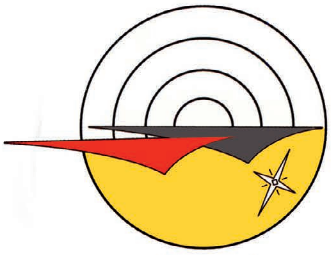
190 Squadron
Shooting Lightning/Defenders/ Magic Touch
(Defender, AH-64)



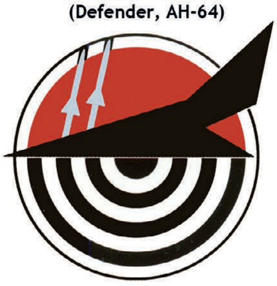
192 Squadron
Hawkeye
(E-2C)



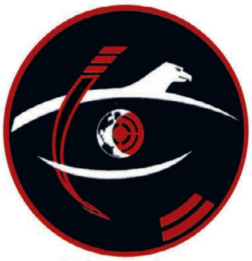
193 Squadron
Naval Helicopters/Defenders of the South/ Defenders of the West
(SA.366G Dauphin, AS.565MA Panther)



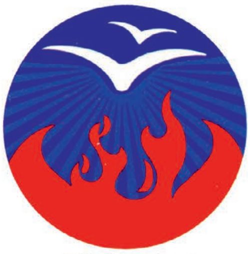
200 Squadron
UAV/First UAV
(Firebee, Chukar, Mastiff, Scout, Searcher, Heron)



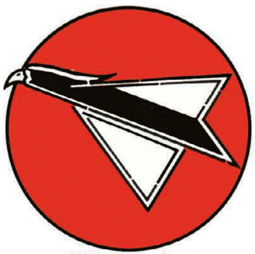
201 Squadron
One
(F-4, F-16I)



210 Squadron
Eitan/White Eagle
(Heron TP, Hermes 900)



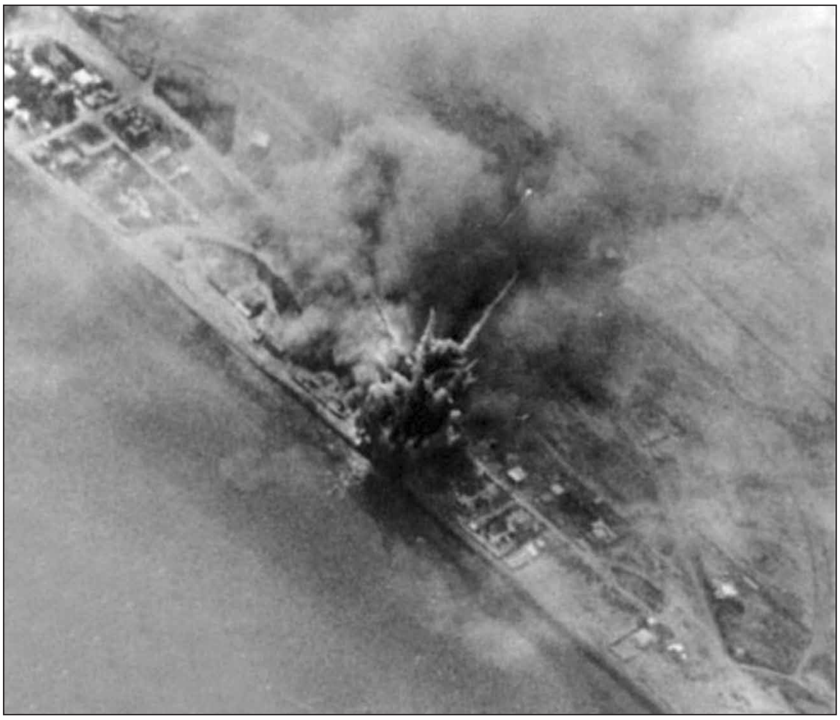
249 Squadron
Elad
(Fireboss)



253 Squadron
Negev
(Mirage, Nesher, F-16)

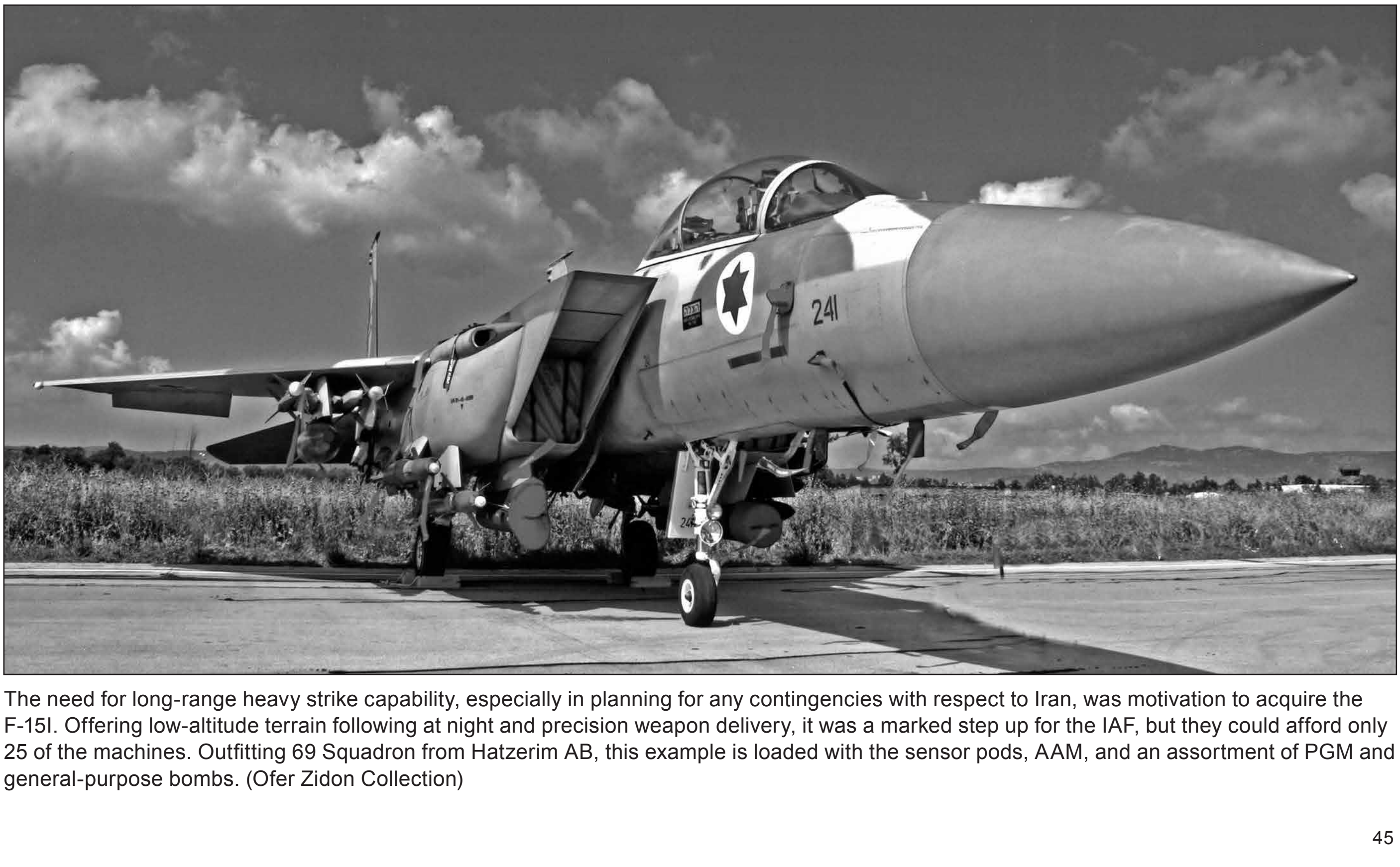
Application of squadron insignia was not very common before the 1950s, and they were not universally applied until late in that decade. Many unit names and insignia evolved over time – usually as units transitioned between aircraft types. The review offered here shows the most frequently used insignia on types mentioned in the text: all are shown as oriented on the port side of the aircraft, where there was a unique orientation side-to-side.

After its expulsion from Lebanon, the PLO had continued to perpetrate terrorist acts against Israel and its interest. Israel had to respond and show that even Tunisian exile was not too far away for the group to be punished. On October 1, 1985, Israel's "long arm" reached the PLO's headquarters complex near Tunis where it was destroyed by IAF bombing. Precision was required because the buildings were near a coastal resort. At 1,280 miles (2,060 km) and three hours each way, this was the IAF's longest-range strike mission to date of writing. The F-15 was chosen for its high reliability, long range, and probably also the twin-engine "comfort factor" for the long over-water mission. The Navy had a vessel with a helicopter along the route in the event aircrew recovery was necessary.


The IAF's training for long range heavy strike with aerial refueling was exercised on October 1, 1985, with an attack on PLO headquarters buildings in Tunis. This image (snapped by a formation leader with a handheld camera) shows the GBU-15 detonations that destroyed or heavily damaged the structures, killing 73 and leaving more injured. The half-dozen F-15Ds flew approximately 2,500 miles and six hours round-trip with refueling from two Boeing 707 tankers. (Author's Collection)

Participating were the six 106 Squadron F-15Ds (all the Ds in the inventory) with CFTs, each armed with a single GBU-15 TV-guided bomb under the port wing, datalink pod on the centerline, a tank under the opposite wings, and the usual assortment of AAM on the starboard side only. Two F-15Cs from 106 (although flown by 133 Squadron aircrew), also with CFTs, carried six 500-lb (227-kg) bombs on the centerline, wing tanks and AAM. Two additional 133 aircraft flew as airborne spares, turning back at the first refueling. National markings were painted over. Two tankers (possibly all the boom-equipped tankers in the inventory) and a C² aircraft flew from Lod AB. It has also been reported that another 707 flew over Tunis to jam radar and communications.

The route avoided Egyptian, Libyan, and American 6th Fleet radar coverage, but proceeded at an altitude above normal airline traffic and permitting refueling. The fighters met the tankers at the 640-mile (1,030-km) point and were topped off until reaching 1,000 miles (1,609 km). One tanker and the spares turned back to Israel at that point. One of the jets that continued aborted five minutes from the target when their GBU-15 developed a fault. During the attack, another GBU-15 failed to guide. In seven minutes, the buildings were destroyed and the F-15s departed, leaving approximately 73 dead and 86 injured. They flight-refueled again on the return.



The need for long-range heavy strike capability, especially in planning for any contingencies with respect to Iran, was motivation to acquire the F-15I. Offering low-altitude terrain following at night and precision weapon delivery, it was a marked step up for the IAF, but they could afford only 25 of the machines. Outfitting 69 Squadron from Hatzerim AB, this example is loaded with the sensor pods, AAM, and an assortment of PGM and general-purpose bombs. (Ofer Zidon Collection)

It is interesting to note that the commander of the Tel Nof wing and the IAF's first jet ace (a Brigadier General and senior to the flight lead), flew on the Tunis mission by bumping another pilot.[31] Also, an F-16 pilot was replaced on the 1981 Iraqi raid with the Ramat David wing commander and one the IAF's highest scoring aces (also senior to the flight lead) after a personal appeal to the Chief-of-General-Staff (CGS) and over the objections of the mission leader and IAF commander. While the IDF always insisted that their commanders "lead from the front," they had also stated that their pilots were all so well trained that manning for operations were simply the next persons on the duty roster. However, combat experience was highly regarded in Israel and bragging rights to "glamorous" missions could influence one's career, both in and out of uniform, in the very competitive society. Few countries boasted of their military record and held combat personnel in as high a regard as Israel. The Iraq F-15 flight and the two contingents of F-16s were all reportedly led by the respective squadron COs with a large number of senior officers among the crews. One of the pilots admitted that he failed to report a faulty fuel supply indication on start-up for fear of being replaced by one of the stand-by jets. The Ramat David commander later confessed to not being fit to fly and this contributed to only his bombs missing the target. The fact that the eight-aircraft F-16 element of that operation were drawn from two separate squadrons, and the F-15s in the Tunis raid flown by crews from two squadrons, also has the appearance of "spreading the glory." The same occurred in the Syrian reactor bombing in 2007 (*q.v.*) with two F-16Is (*q.v.*) drawn from each of two squadrons joining F-15Is from a third. Such strike force compositions can only complicate training, coordination, and operational security. Other logic is that the most experienced personnel help to ensure mission success and commanders bear the ultimate responsibility, though such personnel are generally the least proficient in the aircraft and tactics given their other duties. The use of F-16s for the Osirak strike was another effort at inclusion for morale purposes as the F-15s could have executed the bombing with far less critical fuel concerns.[32]

On August 10, 1973, a pair of IAF Mirages forced a Lebanese Caravelle airliner, *en route* from Beirut to Baghdad, down at Lod. Among the passengers they had expected to find a terrorist leader and his staff, but the men had not boarded the aircraft. The airliner was permitted to depart. On February 4, 1986, two Israeli F-15s intercepted a Libyan Gulfstream II commercial jet east of Cyprus, while on its way to Damascus, and forced it down at Ramat David AB. The intelligence service had reason to believe that nine top terrorists and other Palestinian leaders were aboard. However, the men had disembarked at the last minute. A red-faced Israeli government took the heat and apologized, releasing the airplane after four hours. The outcry in the civil aviation community over these incidents was loud and indignant. The victim of many hijacking incidents itself, it appeared to outsiders that Israel was perpetrating air piracy in the name of national security.

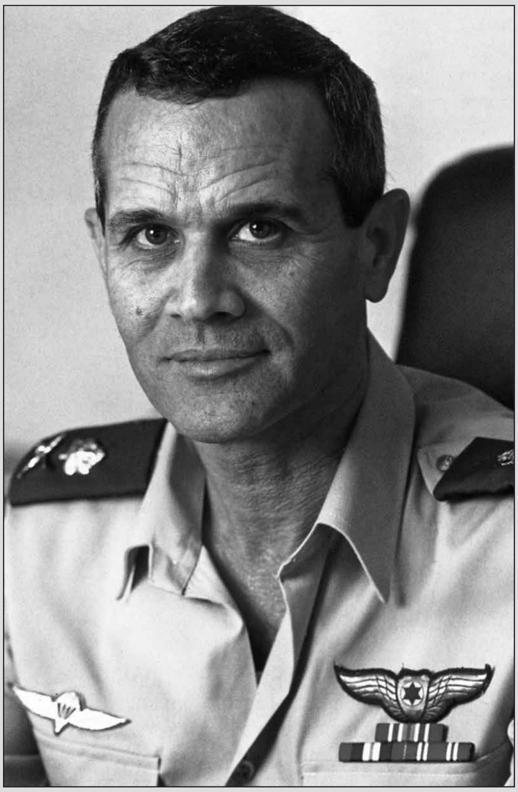
Some of the intelligence material for the Tunis strike is said to have been provided by Jonathan Pollard, a US Navy intelligence analysts who sold highly classified material to Israel. Pollard was sentenced to life imprisonment in 1987 and his wife to five years. A Jew, he had met Israeli Colonel Aviem Sella and, feeling the USA was withholding vital intelligence from Israel, offered to supply the data. Sella, a veteran fighter pilot with considerable operational experience, was instructed to work with Pollard who began in 1985 to supply copious volumes of classified documents. Once the crime was discovered, Sella was indicted in a USA court for his role in the espionage, but Israel refused to extradite him and three co-conspirators, insisting the spying was a rogue operation. Promoted to Brigadier General and given command of Tel Nof, Sella was clearly in the running for the top IAF post. However, the Americans would have nothing to do with him or the base while he commanded there. Consequently, the officer resigned in the interest of USA-Israeli relations.

Israel continued to confront terrorism directed at itself plus Jewish people and interests worldwide. For the Air Force, this included intelligence-gather missions with is 707-based EW and C^3 fleet capable of flying long legs and operating somewhat inconspicuously from international airports after markings were greatly reduced. These aircraft were aloft for most if not all sizable or sensitive military operations. As an example, the Boeings may have made a return trip to Tunis in 1988 for the April 16 seaborne commando raid to assassinate arch-terrorist Abu Jihad. Reportedly, one or two 707s provided ECM support. This disrupted communications across Tunis for the duration of the operation. Another 707 provided C^3 assistance. It has also been suggested that these were combined EW/C^3 aircraft.

Another IAF long-range rescue operation revealed other aspects of the service and its association with the nation's secret services. The Air Force airlifted Ethiopian *Falashas* Jews to Israel both overtly and covertly over several years. In the early 1980s these people had fled their war-torn and famine-plagued country for squalid refugee camps in Sudan – a country with its own severe troubles – hearing the promise of a way to Israel. The Mossad set up a resort on the Red Sea as a cover, passing refugees to Israel Navy vessels off-shore or onto Air Force C-130 landing at an airstrip nearby.[33] The eight night missions, staging from Ovda AB, had to fly low-level through a mountain range to avoid detection by Egyptian and Sudanese radar. Some 1,500 persons were flown out and more by sea transport, but the operation came close to discovery and had to fold. Intervention by the Americans

An Israeli C-130 had flown to Ethiopia prior to the rescue of the Falashas Jews. On September 14, 1972, an IAF Hercules had flown to a remote airstrip in the Danakil Desert to collect a cargo of a dozen wild asses. These were ancestors of the animals had lived in Judea until going extinct in modern times. The 12 animals in Ethiopia were trapped by an Italian exporter and bribes of officials permitted their export. After a stop in Djibouti to refuel, the crated feral asses were delivered to Etzion AB after which they were released into a nearby nature reserve inside Israel to repopulate the species as a conservancy measure.

12th Commander – Herzl Bodinger joined-up in 1961 and volunteered for pilot training. His first posting was to Mystère IVAs, but he moved to Vautours in 1963. In 1964, he broke several vertebrae in a crash landing of a Vautour IIA with an engine fire and spent a long time recovering before resuming his flying career. He did his two-year stint as a flight instructor through 1967, interrupted by the Six-Day War where he flew long-range Vautour missions. He served as deputy CO at 110 Squadron and also 117 with Mirages. In 1972, his first command posting was a training squadron at the Flying School, but flew Mirages and Neshers with 101 during the Yom Kippur War. There the lieutenant-colonel assumed command after the CO was killed. He was there in 1975 to fly the first Kfir to Hatzor AB and begin that transition. Soon after, he went to AHQ to lead the Aircraft Branch of the Weaponry Department. In 1979, Bodinger returned to Hatzerim to command the Flying School and in 1982 was back at Ramat David as wing commander, playing important roles during Operation Peace for Galilee. In 1984, the colonel returned to headquarters to head up the Air Group and a year later commanded the headquarters. From 1987, Bodinger then spent a few years in college before becoming a military advisor to the comptroller in 1990. In January 1992, he was appointed IAF commander. He ushered in the Black Hawks and F-15Is while overseeing IAF contributions to two large-scale operations in Lebanon. He also worked out the acceptance of women to pilot training. Bodinger was around 50 years old at selection (48, still young by international standards) and served for four years thereafter.



Major-General Herzl Bodinger poses for the obligatory headquarters “mug shot” in his IAF commander’s office. (Author’s Collection)

permitted commercial flights of refugees via a third country. Some 6,000 of the Falashas were taken out between November 1984 and January 1985 aboard a chartered 707 staging through Europe.

Revelation of the 707 flights caused the Sudanese to crack down and the operation to fold. The Americans flew about 500 Jews remaining in the camps to Israel in March 1985 aboard United States Air Force C-130s. However, these efforts still left many thousands of Falashas behind in Ethiopia.

It was not until 1991 that another effort could be mounted. The operation was launched when the Ethiopian civil war was reaching its tragic climax and the violence threatened to engulf the remaining Falashas. With the concurrence of the Ethiopian government, and after bribing the rebels, a C-130 brought an advance team into Addis Ababa International Airport’s single runway on May 24. The Israeli team included airfield security, a mobile air traffic control unit, and the operation commander – the Deputy Chief-of-General-Staff backed up by the air element commander, the IAF Deputy Commander for Operations (both generals). Within hours, the first airlifters were arriving. Israeli F-15s escorted the transports at least part of the way to and from Ethiopia. Over the next 24 hours, 14,173 Falashas were evacuated in 41 individual flights to Ben Gurion International Airport by 35 unmarked airplanes – at one point with 28 aircraft *en route* simultaneous. The IAF contribution was 18 Hercules flights with 18 aircraft and eight Boeing 707 flights (including one with hospital interior) with six aircraft. El Al airliners and an Ethiopian Airlines 757 made up the rest of the flights. The Herks carried as many as 180 persons per flight. One 747 carried a record 1,087 people by removing the seats and having the passengers sit on mats. The mission was completed and Israeli personnel departed a few hours before the rebels overran the airport.

Gulf War

In some ways, the dissolution of the Soviet Union in 1991 made the IAF’s tasks more complex. Principal adversaries began to acquire advanced Western weapons. Not only were these generally more capable, but the increase in the variety of EW and SAM systems was equally challenging. The potential development of nuclear, chemical, and biological weapons, combined with suitable delivery systems like ballistic and cruise missiles, became a growing concern.

After Israel destroyed their nuclear reactor, Iraq’s leader Sadaam Hussein set out to build ballistic missiles capable of striking Israel. These were SS-1c Scud B missiles, principally from North Korea, but modified as extended-range al-Hussein variants. The potential for them to be fitted with chemical or biological warheads was worrying. Israel began initial planning for airstrikes to eliminate the threat. Reconnaissance by RF-4 and F-4E(S) helped in tracking development and production of the rockets plus identifying possible targets if Israel chose to strike.

Iraq’s invasion of Kuwait in August 1990 brought immediate threats of military action from the international community if the forces did not withdraw. With no such prospect, a Coalition of nations, led by the United States, moved armies into the area and prepared to liberate Kuwait. Should such a move be made, Iraq threatened to attack Israel. It announced plans to send troops into Jordan, an ally in spirit, and strike Israel with missiles. Israel made clear that it would consider such moves acts of war. The potential for placing unconventional warheads on the missiles to create weapons of mass destruction made the threat intolerable. Although long a virulent enemy of the Jewish state, Iraq's threats were clearly intended to provoke Israel and spark a wider Middle East conflict that would divert strength meant to confront the Kuwaiti occupation.

Much of the IDF was placed on alert in September. Massive civil defense measures were undertaken to prepare for possible chemical and biological attacks. The Air Force instituted a partial call-up of reservists, began flying CAP along the borders, and had aircraft on strip alert. It began training for contingencies, planning to strike the Iraq Air Force and ballistic missile resources. The IAF was prepared to airlift special forces, with requisite air cover, into Iraq's western desert to hunt for the Scuds fired from mobile TELs. This would likely have required the seizure of an air base. The plan involved considerable operational difficulties and would certainly have meant massive violations of Jordanian airspace. Jordan stated that such would be met with force. Plans to destroy the Royal Jordanian Air Force and ground-based air defenses were updated, and training proceeded accordingly. Jordanian forces went on alert and began calling up reservists. The new Apache team worked feverishly to be prepared for combat. Also new, the B200s were hastily fitted with extended-range fuel cells and an EO kit for some role in these plans – probably to assist in searching for TELs.[34]

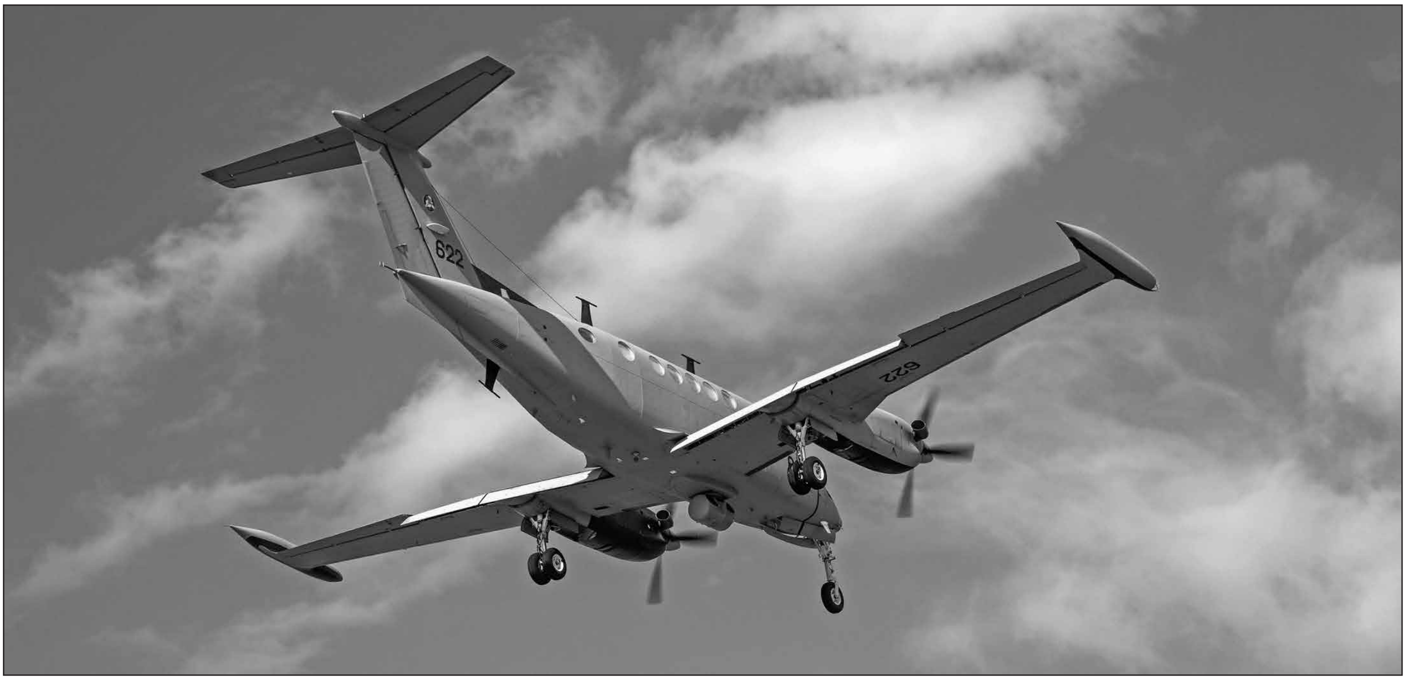
In order to forestall any precipitous Israeli move that could disrupt Coalition plans, the USA turned a deaf ear to Israel's repeated requests for operational coordination. The IAF wanted satellite photography of the western desert target area and coordination on transponder codes to deconflict with other aircraft.

With no signs of an Iraqi withdrawal, the Gulf War began on January 17, 1991, and Iraq made good its threats to fire missiles at Israel. The first Scuds fell on January 18, looking like the Jewish nation's worst nightmare come true. Defense Minister Moshe Arens told the USA Secretary of Defense, Dick Cheney, over the hotline between Washington and Jerusalem, that IAF jets were poised to strike at Iraq. Lacking better intelligence data, the initial mission was expected to be a photo reconnaissance sortie. Arens again requested aerial photos or some means of coordinating the Israeli actions. In line with the latter request, he suggested that the Coalition forces might stand-down their activities in the target area for four hours. In later discussions, it was suggested that the region west of the 42nd longitude line be left to the Israelis. Arens further proposed that the USA arrange a free-flight corridor across Jordan or Saudi Arabia to allow Israeli combat aircraft to pass through their airspace unmolested. None of the proposals were acted upon by the Coalition.

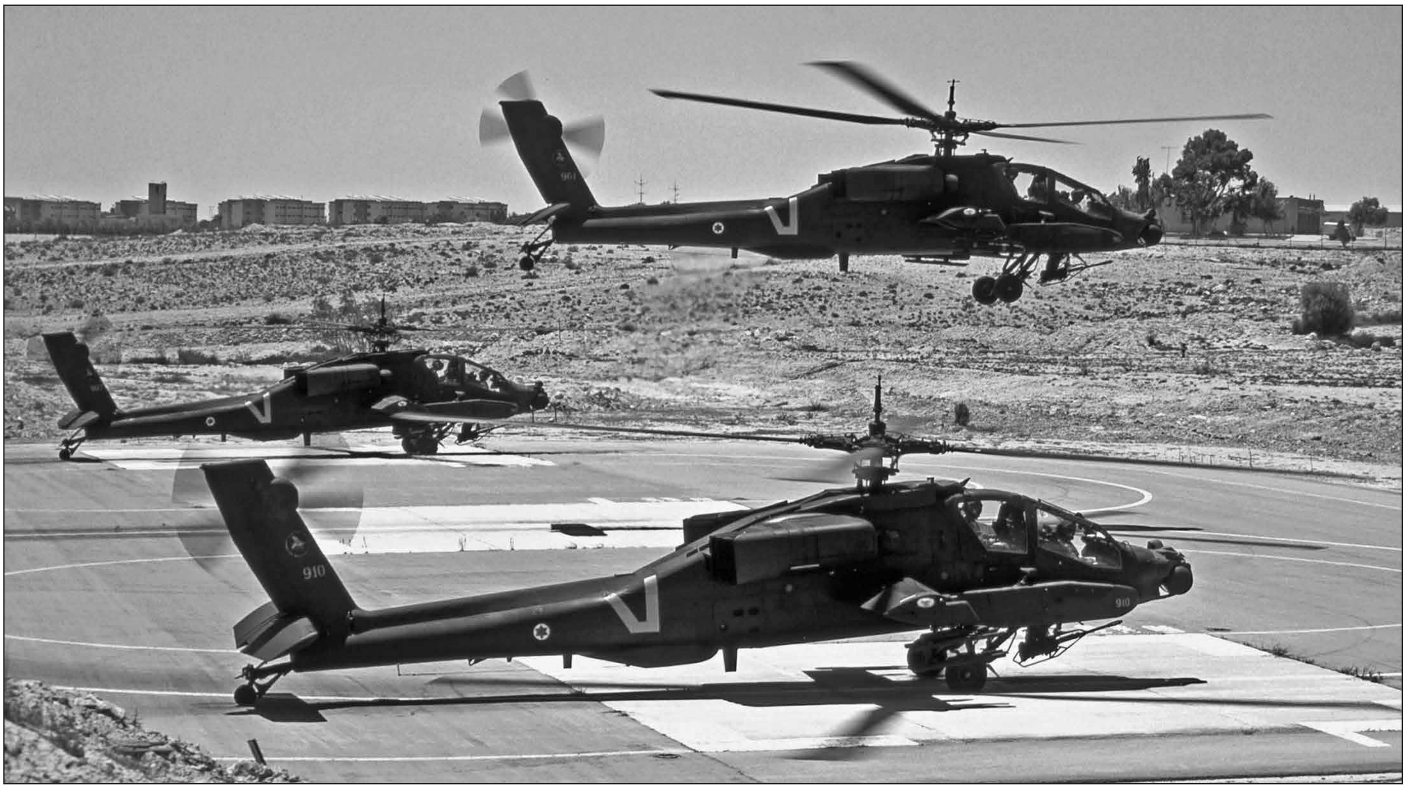
On December 14, 1990, a Cessna U206 Stationair crashed on a night takeoff from Ramon AB *en route* to Tel Aviv, killing all five onboard. This was particularly tragic because all were from 113 Squadron and included three senior pilots with one a deputy CO, a navigator, and the operations officer. That AH-64 unit was just working up to operational capability as a conflict with Iraq was in the offing, and the personnel losses robbed it of nearly half its qualified aircrew. The remaining team had to work extra hard to be ready for possible war.

After the initial missile attacks, the IAF had aircraft in the air and crews in cockpits on the ground prepared to execute the complex attack plan that was fraught with explosive political implications. A call from Washington resulted in an immediate cancellation – indicative of the extraordinary relationship.[35]

Following a second day of attacks, US Army and Dutch Patriot missile units, with new software to provide some anti-ballistic missile (ABM) capability, were deployed to Israel. The USA also provided the Israelis a ground station for receiving four-minute warning of inbound missiles from a satellite-based detection



The Beech B200 Super King Air was acquired to replace the Dorniers in the observation and surveillance roles plus augment the transport fleet. When first arriving during the tensions of the Gulf War, several were hastily fitted with electro-optical surveillance kit such as seen on Israeli UAVs (the sensor turret rotated to the stowed orientation in this image). The equipment was maintained beyond the war. This example, bearing the 100 Squadron badge, also has a good deal more communications antennas than standard. (Israeli Air Force)

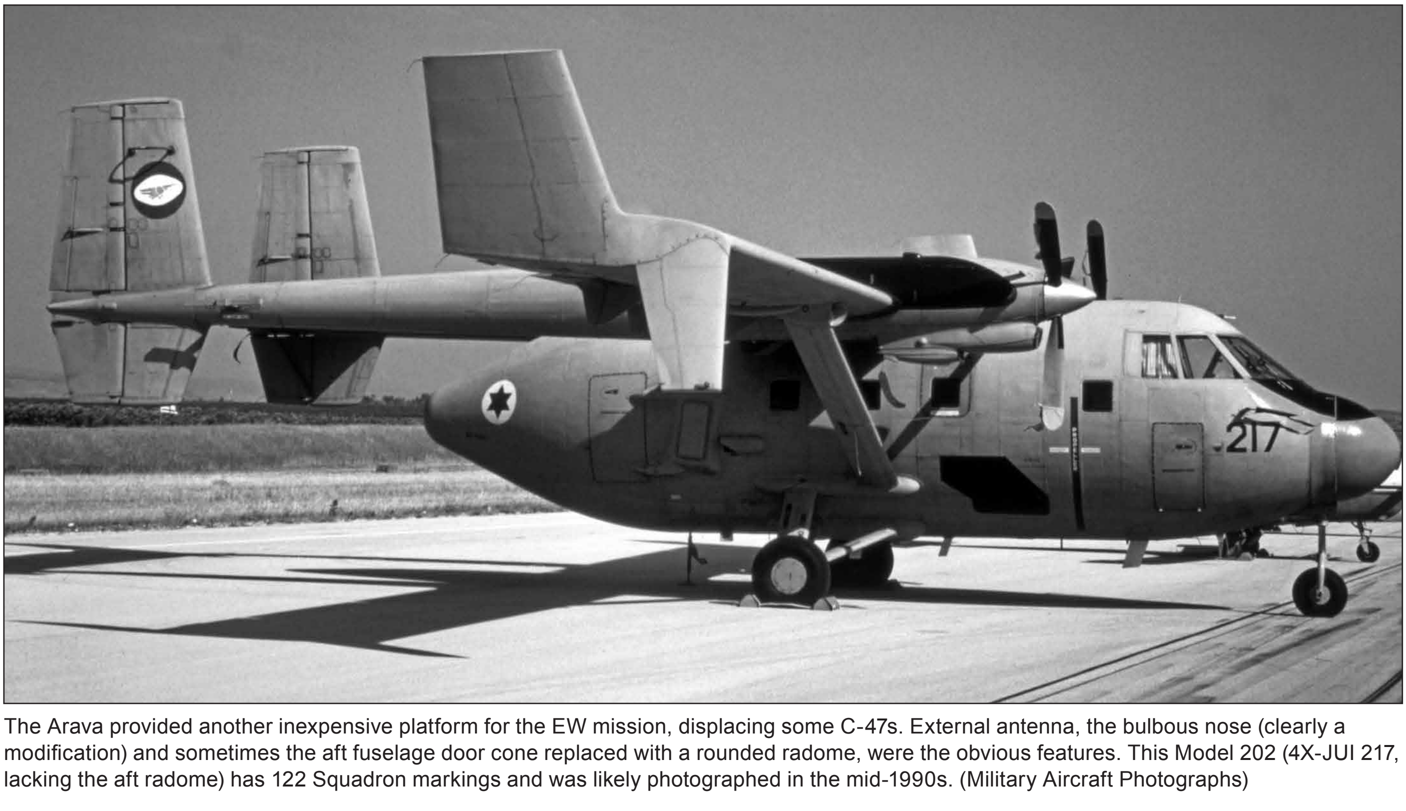


It was a long and torturous path for the Apache to reach the IAF. The initial models were AH-64As and the same configuration as operated by the US Army. They arrived in time for the Gulf War, and the small and immature Israeli team hastening to prepare should they be drawn into combat. These 113 Squadron AH-64As, likely seen at Ramon AB, were additional US Army machines given to Israel following the war, in 1993. (Ra'anan Weiss Collection)

network. This marked the first occasion in which USA combat troops were deployed on Israeli soil, aside from training.

The Americans continually stalled Israeli offensive action by promising to send a coordination team. They also directed tremendous resources to destroying the Scuds. Two or three times during the first week of the war the IAF was poised to strike and only last-minute decisions by the government forestalled the missions. Bad weather, lack of adequate intelligence, and the Coalition's refusal to coordinate operations repeatedly delayed the attack. If Israel had carried out its threatened actions, the course of the war could have been much more difficult for the Coalition.

Israel stood-down by February 12 when air-action from Iraq or a response from other Arab states appeared unlikely. She provided the USA with a list of targets it had identified in Iraq and advice on methods for neutralizing the TELs. The Coalition's Scud hunting efforts yielded somewhat disappointing results, despite 15 percent



The Arava provided another inexpensive platform for the EW mission, displacing some C-47s. External antenna, the bulbous nose (clearly a modification) and sometimes the aft fuselage door cone replaced with a rounded radome, were the obvious features. This Model 202 (4X-JUI 217, lacking the aft radome) has 122 Squadron markings and was likely photographed in the mid-1990s. (Military Aircraft Photographs)

Young officers and enlisted personnel commonly man the control towers at Israeli air bases. Many of the officers are drawn from those washed out of pilot training. (Israeli Air Force)

of air assets devoted to the task. Although the number of missiles fired per day fell from a peak of about eight to only one or two, launches continued throughout the war.

Iraq fired 38 Scuds at Israel between January 18 and February 25, 1991. Fortunately, they carried only high explosive warheads and caused relatively minor damage and loss of life (two killed, 208 injured, 4,000 left homeless) owing to their poor design and accuracy. These results helped in stilling Israel's hand. Plans to test the Jordanian reaction to over-flights by conducting a reconnaissance mission to Iraq on February 26 and 27th were scrubbed because of inclement weather and other concerns. The war ended on the 28th.

Many citizens and service personnel were angry at the Zahal inaction, but there was no reasonable alternative apart from sparking a general war in an uncertain bid to eliminate the missile launchers. The Coalition was already at the Scud-hunting task, although Israel criticized the scope of the effort. The IAF insisted that it could have achieved much more. However, training missions against dummy TELs hidden in the Negev reportedly also yielded poor results.

Tensions rose again in the fall of 1991 and it was suspected there were still TELs in Iraq's western desert. The IAF prepared to strike and dispatched an F-15 or RF-4 reconnaissance mission on October 4 to search for targets. The aircraft overflew Syria inbound to the area, and then Saudi Arabia and Jordan on the return. Presumably, nothing was found worthy of launching a problematic strike mission.

Throughout the 1990s, the ballistic missile threat against Israel proliferated, and became more significant than the Scuds. The Americans provided an X-band radar and operators to detect inbound missiles.[36] Israel had initiated the Arrow anti-ballistic missile development in 1986, but this would take many years to reach fielding. A comprehensive air defense network was conceived with a lower tier to shoot down short-range projectiles and a mid-tier for aircraft and battlefield missiles. These had the potential for reducing the need for the IAF to hit launchers or make retaliatory bombing raids. The Air Force opposed the program as it was defensive rather than offensive and consumed a goodly wedge of the budget pie.

Many photo reconnaissance flights over Iraq were flown from 1978 through at least 1982, especially in the lead-up to the Israeli attack on the nuclear reactor in 1981 and as Iraq developed ballistic missiles. One such mission on January 3, 1982, targeted the H-3 airfield. It was flown by 119 Squadron F-4E(S) number 492, with squadron CO Gideon Sheffer and navigator Yuval Naveh, and RF-4E 491 with Ran Granot and Daniel Grossman navigator. The Phantoms, with at least one refueling from a KC-130, were escorted by F-15s. The formation flew in at very low altitude, but climbed and accelerated for the photo run. The aircraft were detected and interceptors were scrambled from H-3. Two MiG-21s gave chase and the pilots were so determined that they flew beyond recovery range of an airfield. One pilot crashed from fuel exhaustion while his companion made an emergency landing on a dirt track.

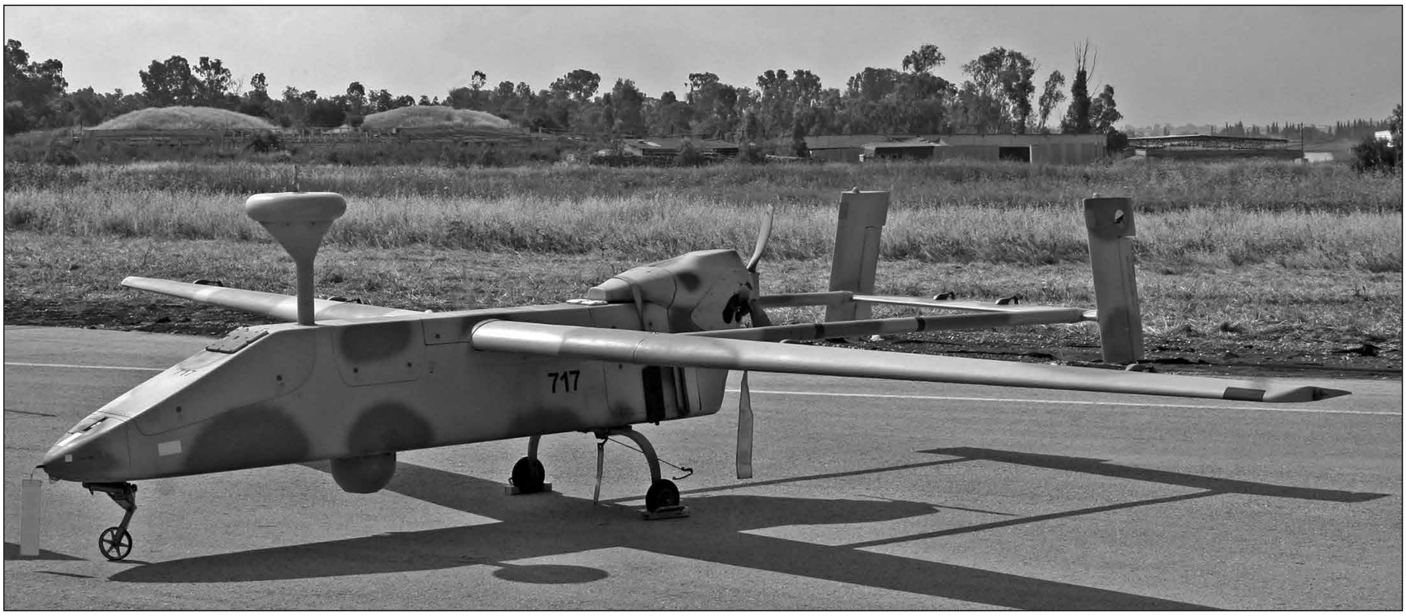
13th Commander – Eitan Ben Eliyahu was enlisted in 1962 and was sent to pilot training. After Operational Training Unit (OTU) at 113 Squadron, he remained to fly Ouragans. In 1965, he returned to the Flying School as an instructor where he helped in reestablishing the aerobatic team. He returned to 113 where he fought during the Six-Day War. Afterwards he remained at Hatzor AB, but moved over to 101 Squadron and its Mirages. With the advent of Phantoms, Ben Eliyahu transferred to 201 and served as a deputy CO. Just before the Yom Kippur War, he was assigned to head the Operations Planning Department in AHQ, but in the middle of the war returned to Hatzor to command 201 Squadron after the CO was injured in an ejection. Later he was tapped to help introduce the F-15 to IAF service and commanded 133 Squadron from its formation. During his years in the cockpit, the officer downed four enemy aircraft. In 1979, Ben Eliyahu assumed leadership of the Weaponry Department until going off to college in 1982. In 1984, he took over as wing commander at Ramat David. Following another stint of college, Ben Eliyahu headed up the Air Group, interrupted by more study before leading the Headquarters. In 1995, he became assistant head of the Operations Branch before being appointed CO in July 1996. During his time in the front office, the general brought the first Arrow anti-ballistic missile system on line.

Major-General Ben Eliyahu was appointed the Air Force CO in July 1996 and saw the service into the new century. (Author's Collection)

Near

The military occupation of the Territories was a financial and manpower burden for the MoD that was persistent and unwelcome. Gaza and the West Bank contained millions of Palestinian Arabs who hoped for these lands to become part of a future state as a solution to their limbo status. They resented the occupation that limited personal liberties and opportunities. Egypt relinquished any claim to Gaza in its 1979 peace treaty with Israel and Jordan did likewise with the West Bank in 1988. The 1994 peace treaty with Jordan brought the status of the Palestinians to the fore. Negotiations with Syria were few and floundered on Syria's insistence that every inch of the Golan be returned, yet without establish normalized relations. Similarly, Israel's security demands seemed unattainable.

The principal sticking points in the Israeli-Palestinian imbroglio were refugees' right of return to former residences and property in Israel or compensation, a state in the occupied territories and the drawing of those borders, limitation and



The final incarnation of the Scout RPV was the Searcher II UAV with much greater capabilities. This image from 2007 reveals the engine change, the elevated antenna fairing to ensure a solid communications link in any aircraft attitude, and the larger-span wing. The vehicle wears the 200 Squadron badge and a cover over the bottom sensor ball. (Ofer Zidon Collection)

The Apache scored its second air-to-air "kill" on May 24, 2001, when a 113 Squadron helicopter was sent to intercept a slow-moving target from Lebanon. This was a Cessna 152. The pilot did not respond to radio calls, hand signals to land, or warning shots from the AH-64's cannon. Fearing a suicide attack on the anniversary of Zahal's pullout from southern Lebanon, the decision was made to shoot the airplane down over a sparsely populated area. After flying 20 minutes down the coast and 44 miles (71 km) into Israeli airspace, a Hellfire blew the Cessna apart and the remains came down on the coast. The student pilot had taken off from Beirut without authorization, but there were no explosives onboard. His intentions remained unknown.

removal of Israeli settlements and land connections between them and Israel, the status of east Jerusalem as the capital of the new state (Israel had annexed it), lessening Israeli control of the Palestinian state's infrastructure, demilitarization of any such state, recognition of Israel and renunciation of the armed struggle by the Palestinians, and satisfaction of Israeli security guarantees. International efforts to broker the conflict's resolution were many over the decades, marking it as one of the most intractable yet significant of the world's armed struggles. The greatest progress was made in the 1993 Oslo Peace Accords and 1995 Taba Agreement (Oslo II) that saw both parties agree to work towards a two-state solution.

During the years that followed, the Palestinian National Authority (PA) assumed control of many civic functions in the West Bank and Gaza Strip. It self-governed many large Arab towns and all of Gaza, but Israel still patrolled and oversaw a majority of the West Bank. Its military crackdowns following terror attacks were humiliating. Continuing, sometimes tough, negotiations failed to achieve a final status agreement and racial tensions persisted in sparking violence.

Israel's overriding security concerns were preventing terror attacks from and within the territories, containing civil unrest, and protecting Israeli citizens who settled in the occupied areas. Thousands of IDF soldiers served each month in the tense areas, acting as military policemen much resented by the vast majority of the inhabitants. Pent-up Palestinian frustration gave vent to a civil uprising (*Intifadah*) beginning in 1987 and lasting several years. The IDF response was harsh suppression, arrests and expulsions, home demolitions, and sometimes live-fire incidents that took hundreds of lives. The Air Force's role was minimal, usually limited to surveillance by light-planes, helicopters, and RPVs. Tear gas, gravel dispensers, and colored water sprayers, were created and mounted on Bell 212s for riot control.[37]

CHAPTER 4

21ST CENTURY CHALLENGES

As the nation and its Air Force approached their 75th anniversary, they could count many achievements, but many remaining challenges as well. Although a well-off country with many resources, supporting an unusually large military that remained quite active confronting an unusual array of threats continued to be a fiscal burden on its inhabitants. This was eased only by American contributions. The efforts brought relative security, but Israelis remained targets for terrorist and hostile nation states with increasingly worrying means of wreaking havoc.

New Orientation

The Air Force got a pair of office towers in Tel Aviv during 2002 as a new HQ complex. The year 2005 marked a notable change for the Israeli Air Force. After 57 years, the MoD made a name revision to Israel Air and Space Forces (IASF). This recognized the Air Force's space-based assets and its capabilities beyond the borders as a strategic force.

The IASF purchased additional simulators, eventually for all primary combat aircraft. This immediately reduced the need to send personnel to the USA for periodic training, allowing it to be conducted more frequently, and to permit sensitive missions to be rehearsed. Ostensibly to supplement costly proficiency flights, budget pressures would eventually compel a substitute of simulator for flight time. Just paying for the equipment and contractor support saw a 5 percent reduction in flying hours.[38] One IASF commander stated a goal of five to 10 percent of required flight time be logged in a simulator, but some platforms like assault helicopters reached 15 to 20 percent by 2016.[39]

In 2000, the IAF and Ground Forces Command agreed that only attack helicopters would provide CAS when called, but that troops should deal with nearby threats. Air liaison officers were removed from IDF field units.[40] Each service trained as if the other did not exist.[41] The experience in Lebanon during summer 2006 (*q.v.*), where the two services could not even initially communicate on a common network, suggested this practice needed to be reexamined. It was reversed by 2009.[42]

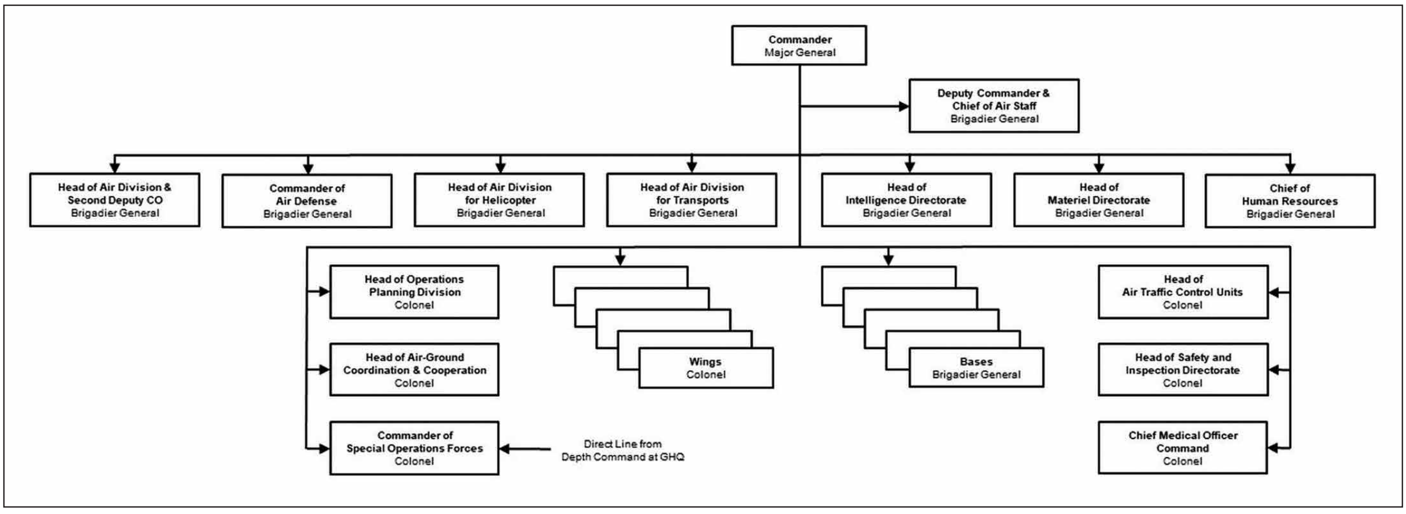
The Air Staff came to include a colonel devoted to coordination and cooperation with ground forces. (See the staff diagram on the next page, though a generalized depiction.) Veteran combat pilots staffed air support coordination detachments at brigade headquarters and were given suitable equipment to include real-time video links from drones, then known as UAVs. Air control officers were resident down to the brigade level where immediate combat support was directed, not from the AHQ.[43] The helicopters continued to serve as the principal on-call CAS and were ever-more closely aligned with Ground Forces. A brigade commander had direct control over employment of a partnered squadron's assets. The IASF established a joint air-land cooperation center to train ground warfare officers to assist in rendering supporting. This tended to set the gunship teams apart from the fixed-wing community and command had to work to keep the force unified. By 2008, 70-80 percent of exercises at the brigade level involved

Due to cost, the Israelis were slow adopting simulators to practice emergency procedures and supplement flight training. For many years, aircrew were sent aboard, usually to the United States, for this instruction – an excursion anticipated with relish. It was only after 2000 that investment in these resources were made to provide long-term operational savings and advantages. (Israeli Air Force)

CAS provided by fixed-wing as well as helicopters. Likewise, UAVs were more responsive to the needs of ground combat elements.

Into the new century, there remained many Arab and Muslim countries that condemned Israel and encourage violence against the Jewish nation and its interests abroad. However, none of these nations were prepared to engage in large-scale hostilities given the certainty of great harm inflicted by Zahal and supported by the United States. The IASF, specifically, remained a strong deterrent force for those not bordering Israel, and Navy vessels could fire missiles to hit some targets from coastal waters. The USA ensured that the IASF remained the best equipped air force in the region. No reasonable possibility existed that nations would act in concert to launch a war against Israel without considerable advanced indications. Syria was militarily inferior and, after 2011, consumed by civil war. They preferred to antagonize Israel via Hezbollah. Iran did likewise through funding and arms deliveries to Hezbollah and the Hamas organization in Gaza. Although not "friends," Egypt and Jordan had no interest in making war against Israel. Few in the world openly embraced Israel because of its uncomfortable defense actions and military occupation, but most were content to do business with her.

Israel's "neighborhood" was not peaceful, but also not hazarding her survival. Recognizing the great reduction in threats, and assessing the best means for dealing with what remained, Israeli


Commander
Major General
Deputy Commander & Chief of Air Staff
Brigadier General
Head of Air Division & Second Deputy CO
Brigadier General
Commander of Air Defense
Brigadier General
Head of Air Division for Helicopter
Brigadier General
Head of Air Division for Transports
Brigadier General
Head of Intelligence Directorate
Brigadier General
Head of Materiel Directorate
Brigadier General
Chief of Human Resources
Brigadier General
Head of Operations Planning Division
Colonel
Head of Air-Ground Coordination & Cooperation
Colonel
Commander of Special Operations Forces
Colonel
Direct Line from Depth Command at GHQ
Wings
Colonel
Bases
Brigadier General
Head of Air Traffic Control Units
Colonel
Head of Safety and Inspection Directorate
Colonel
Chief Medical Officer Command
Colonel

The IASF command staff organization circa 2000s and 2010s are shown sans the lower-level branches. Variations occurred during this period and some titles were varied in sources by different translations from the Hebrew. (Author) military spending declined steadily. By 2015, the defense budget was down to 5.4 percent of Gross Domestic Product, equal to that of Russia and exceeded by only two other nations. By 2018 the number was 4.3 percent. The portion of the budget devoted to personnel costs continued to rise. Despite being the 16th wealthiest country in the world with one of the highest *per capita* incomes, Israel's military remained a great monetary burden on a population of just 8.6 million, but also one of its most respected institutions.

Defense subjects were discussed more openly by the government and citizens, reflecting the democratic ideals. The MoD was more candid about some force structure, capabilities, and operations. Combat operations were briefed to the press with voluminous facts and figures. Cockpit video were posted to the Internet and social media. Squadron numerical designations and basing was eventually openly revealed, but numbers of aircraft remained a sensitive topic. All this served to inform the populace, but also warn potential adversaries while only hinting at some means that may not have actually existed. Disinformation remained a well-worn tool. Israeli industry continued developing and delivering the most modern weapons. However, defense manufacturing and exports fell to number three as the security situation improved and threats narrowed with little prospect of a major war.

Constriction

The shrinking defense budget meant that the IASF fleet was reduced and became more focused on precision strike, long-range capabilities, and the most economical means of maintaining readiness. The rate of change in the fleet, with respect to hardware, slowed. This paralleled the aviation trends throughout the world given the more moderate pace of change in aeronautics and propulsion, plus the tremendous cost of new weapon systems. Instead, the electronic content of the aircraft were upgraded about once per decade to avoid obsolescence and to introduce capabilities enhancing mission effectiveness. Israel took advantage of such programs within the USA fleet or, more commonly after 2000, performed their own as this became a specialty of the local industry and helped ensure unique and classified capabilities. Like types were concentrated at the same bases to simplify sustainment at reduced costs. This suggests less concern with a surprise attack and enough warning to disperse the force to emergency fields. The smaller fleet also meant a more shallow ability to absorb attrition or lose assets briefly if a type was grounded. Consequently, technical acumen was deepened and aircrew were more carefully selected and trained, with greater investment in training resources. The Air Force came to reflect the best of Israeli society and was a source of great pride.

There were structural changes in the new century as well. In 2008 to 2009, the service vacated Lod AB. All the "heavies" were transferred south to Nevatim that had been so under-utilized since built that closure had been contemplated. The move helped reduce the military traffic over crowded central Israel. Much construction at the base was required, including a new 12,800-foot (3,901-m) runway – the longest in the region. Leaders had long encouraged settlement in the south, and so moving hundreds of military families and creating civilian facilities for them served this goal as well. Sde Dov AB was subject to much capital investment in the 2000s to replace dilapidated infrastructure. Despite this, there were efforts since 2008 to close the dual military/civilian airport and relocate the squadrons to save money, reduce air traffic, and turn the land over for high-rise apartment construction. After several proposed solutions, the light aircraft units were unified and moved to Hatzor AB in June 2019, with some aircraft sold.[44]

As the fleet contracted, the focus shifted to modernization by retiring older platforms and improving what remained to save on operational expenses. Another consistent goal of modernization was to lower the risk to innocents during military operations. This meant increased use of PGMs to reduce collateral civilian deaths and property damage, especially as terrorists operated from amongst them in built-up areas. It also sought to ensure first-strike destruction of high-value targets while exposing the fewest assets as possible to counter-action. This reduced protests from the United States and the wider world community. These factors likewise justified the use of very expensive weapons in attacks on low-value targets and in urban settings.

Israel was faced with fewer mission types and extent than nations with worldwide obligations possessing separate naval plus army air arms to support. Its air force was comparatively large and capable, given the size of the country and population, with no gaping holes in capabilities. However, it had little ability to sustain a long war or absorb heavy losses – though no foreseeable foe or coalition was likely to deliver such destruction. Should such emerge, that is where Israel relied upon the United States and other friendly nations to assist it with diplomacy to head-off or reduce threats that could not be met by the conventional military means at Israel's disposal.

At the end of 1997, Israel took a radical step towards rapid modernization, hoping for a big pay-off in significant operational cost reductions. They decided to draw immediately on military assistance funds the US Congress was expected to authorize over the next decade. Although this would drain the account for later use, the Americans approved the approach. Further, Israel and the USA agreed to eliminate the $1.2 billion of economic aid over 10 years, beginning in 1999, while converting half to military aid with 25 percent expended inside Israel. The USA rewarded the state's agreement and implementation of the 1998 Wye River Memorandum to resume implementing the Oslo Accords (that ultimately stalled) with $1.2 billion in additional military assistance. Referred to as "IDF Beyond 2000," the modernization program was to see $2 to $3 billion funneled to Air Force weapons procurement. This would allow the replacement of old aircraft with more modern equipment. It was anticipated that up to 110 new aircraft would be purchased. Beyond this, the Air Force saw the need for up to $15 billion to meet all of its modernization objectives. In late 1998, the government agreed to the first increase in the military budget in 10 years. The changing defense realities also prompted a major IDF reorganization and doctrinal realignment dubbed "Crossword 2000." By mid-2002, the continuing low-intensity conflict with the Palestinians was sapping funds, causing the rollback of some purchases. The modernization had to be stretched out.

In 2016, the USA and Israel concluded negotiations for a $38 billion, 10-year (2019 to 2028) foreign military assistance package. Again, plans were formulated to immediately draw funds from the out-years for near-term acquisitions and gain rapid savings

By the 2010s, most ECM equipment was carried internally aboard fighters and EW support aircraft. However, A-4s and the early-model F-16s still carried jamming pods in support of strikes where they could stand-off the immediate engagement area. This F-16A of 115 Squadron, out of Ovda AB, may be supporting an exercise in which it is representing adversary jamming assets. Note also the scabbed-on flare/chaff dispensers on the vertical tail island that was an early Israeli addition to the jets. (Ofer Zidon Collection)

in operational costs. One difference was that the allowance for Israel to convert a quarter of the funds to shekels for offshore procurement was to be phased out over the life of the package. This compelled Israeli firms to seek American partners so that they could still reap some benefit of the spending. Most contracts were delayed past 2019 by political turmoil from indecisive elections.

Rationalization

The IAF hoped to retire the A-4 in 2005, but it remained an important training asset with no suitable or affordable replacement. To operate it further required a program to update the avionics with new HUD and panel displays, modern navigation system, stores management and delivery computer, and a digital recording system supporting detailed debriefings. Perhaps only 30 or fewer aircraft received the modifications. Eventually only the 102 Squadron retained Skyhawks, maintained under contract, primarily for fighter pilot advanced training. Their final operational role consisted mostly of dispensing Samson decoys, flying a jamming pod on the centerline station, performing leaflet drops, and ejecting flares for ground illumination.[45]

The early F-15s underwent upgrades that incorporated elements of the F-15I cockpit and avionics, self-protection systems, and changes easing integration of PGMs. However, airframes with the most hours or needing the greatest work were retired. A second wave of modernization followed a decade later addressing structural life-extension and rejuvenation of the electrical system intending to allow the fighter to operate until 2025. The F-15I itself entered a more modest upgrade program that touched the structure and radar.

The F-16A/B jets were turned to training without major investment. Some of the oldest machines were being withdrawn in the first decade of the new century. Apart from QRA for the 40 remaining by 2016, their only expected operational employment was dispensing flares for illumination and perhaps assuming the 102 Squadron's mission with their centerline jamming pod as the last Skyhawks were retired that year. The earlier decision to have combined F-16C/D squadrons was reversed.[46] The single-seat jets focused on deploying autonomous weapons while the two-seaters generally carried optical- and laser-guided munitions. This fleet underwent a modernization to extend their structural integrity and insert some F-16I features (*q.v.*) such as the wide-angle HUD and digital debriefing system. All these efforts improved interoperability while replacing old, maintenance-intensive equipment for expected overall cost-savings.

In 1996, the IAF announced a competition to replace 120 early F-16A/B, the F-4s, and the last A-4s. Understood to be limited to American manufacturers because of the need to apply USA aid funds, the military aircraft manufacturers offered many solutions as variants of existing designs. Central would be integration of Israeli content expected to include radar, mission computers and avionics, datalinks, self-protection EW assets, helmet-mounted display (HMD) with weapons cueing, and integration of Israeli weapons. As in the past, selling warplanes to Israel was considered prestigious and a vote of confidence in the product.

Ultimately another growth of the Israeli Block 40 F-16D emerged as the most affordable option with the desired capabilities and 25 percent offset of Israeli content or manufacture. This would have another increase in weapon load capacity, conformal fuel tanks mounted at the wing/fuselage interfaces atop the aircraft, the latest American radar, LANTIRN navigation pod supporting low-altitude automatic terrain following, the Litening targeting pod, and the same engine as the F-15I. The radar was a growth of the model in the earlier Block 40 machines, but with synthetic aperture capability for ground mapping and weapon delivery in adverse weather. It also provided cueing for the AIM-

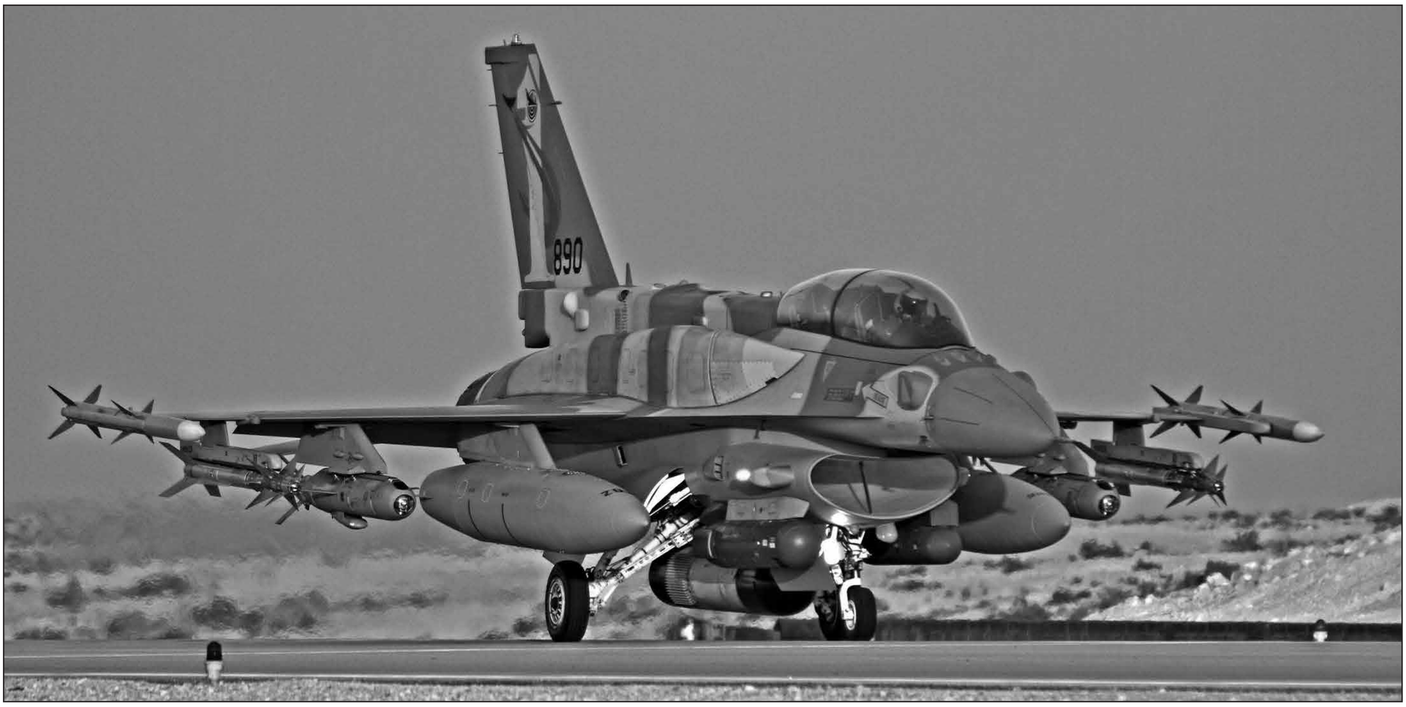
120. Although there were plenty of "hooks" allowing the IAF to integrate additional capabilities into the aircraft, the Israelis insisted on having access to the proprietary software source code for the flight computers to permit greater ability to alter the machine. Although then-General Dynamics resisted the request, some accommodation was eventually reached. This would become a repeated theme with American industry hesitant to give Israel too much access for fear product details would find their way into competing Israeli offerings.

The IAF was so convinced the new Block 52+ F-16I was an ideal choice that the government ultimately ordered 102 aircraft at a staggering $4.5 billion. Delivered between 2004 and 2008, they pushed out Skyhawks and Kurnass 2000s. (The Israelis had refused to acknowledge retirement of the F-4 and its deep fleet reductions for several years, rolling out a Phantom during public displays as misinformation.) The F-16Is and F-15Is got an Israeli satellite communications (SATCOM) system in around 2005 to transmit and receive secure data and voice despite range and low altitude. A Rafael system introduced in the mid-2000s allowed low-altitude flight with just inertially aided GPS guidance combined with terrain databases to eliminate the expensive and radiating LANTIRN pod.[47]

Apart from purchasing American AIM-120 and AIM-9M missiles, Israeli AAM development proceeded. A purely active radar-homing BVR missile, the Derby, was probably introduced in 2002 and underwent improvements since. Lighter than the AIM-120, it was felt more suitable for F-16 application. The Python 5 brought BVR with an IR missile fired in a lock-on-after-launch mode based on a track from the aircraft's radar and cueing via HMD. Perhaps entering service in 2005, it also facilitated a look-down/shoot-down capability. In 2014, the IASF request for the all-aspect AIM-9X was approved, but adoption was unconfirmed until surely coming with delivery of the F-35I (*q.v.*). These outstanding AAM allowed air-to-air engagements from greater distance and with greater reliability to compensate for a force that emphasized heavy fighter-bombers instead of agile interceptors.

Expanded use of PGMs saw the Air Force seek diverse assets. The service augmented its stock of Paveway LGBs with locally developed IR-guided Opher plus indigenous Griffin and Lizard laser-guidance kits applied to standard bombs. It acquired Joint Direct Attack Munition (JDAM) kits from the USA to turn the family of "iron" bombs into PGMs with GPS/inertial targeting of coordinates loaded in-flight. The IASF desired such precision from smaller weapons for a narrower radius of explosive effect and ability to carry more weapons. This led to procurement of the GPS-guided GBU-39 Small Diameter Bomb (SDB) that was a 250-lb (113-kg) glide weapon with 68-mile (109-km) range depending upon release altitude.

Israel developed its own next-generation precision glide bomb, the Spice. It nominally operated with GPS/inertial guidance given pre-programmed target coordinates, but also possessed EO guidance permitting final precision correction of the impact point by the navigator in the aircraft, especially to hit a moving target or to dump the weapon if unacceptable collateral damage appeared imminent. A Spice kit was initially applied to the family of 1,000-lb and 2,000-lb (454- and 907-kg) bombs. This gave the heavy weapon a 37-mile (60-km) range and 62 miles (100 km) for the lighter. Integral assemblies were created for 500-lb (227-kg) and 250-lb (113 kg) warheads with approximately 62 miles (100 km) range. The heavy weapons were carried primarily by F-16C/Ds while the smaller could be employed by F-35s (*q.v.*). The Popeye 2 was a reduced size from its predecessor at 2,500 lb (1,134 kg) for operation on the F-16I. The Delilah decoy was remodeled as a 412-lb (187-kg) air-launched cruise missile with a 66-lb (30-kg) warhead and up to 155-mile (250-km) range. However, this was principally intended to loiter until a target emerged. Targeting was initially by GPS and inertial coordinates, either pre-programmed or entered before launch, but the weapons officer would direct



The F-16I gave the single-engine type much added range (note shoulder-mounted conformal fuel tanks) and strike capabilities, especially when combined with PGMs. 201 Squadron's 890 is armed with Delilah stand-off missiles plus matching centerline data pod, plus Python 5 and AIM-120 missiles. The LANTIRN pods on the inlet "chin" support low-altitude terrain following. (Ofer Zidon Collection) final guidance to intercept even a moving target via a datalink pod. This reflected an effort to reduce reliance on GPS, which can be jammed. The Delilah evolved to include an anti-radiation variant. Augmenting these was the heavy Modular Stand-Off Vehicle glide weapon with a 1,500-lb (680-kg) warhead or sub-munitions. The service also reportedly began employing the Israeli Rampage in about 2018. This was a rocket-boosted precision munition, with navigation satellite and inertial guidance, of 15.4 feet (4.7 m) length and grossing 1,257 lb (570 kg). It possessed an unspecified long stand-off range.

Seeking to acquire an edge unlikely to be matched by adversaries for quite some time, Israel pursued a potential purchase of the stealthy F-22 Raptor. Stealth technology could partially solve the problem of flying across the territory of surrounding nations *en route* to distant targets. However, the ultimate small production run meant exceptionally high unit costs and the Americans decided to withhold the aircraft from foreign sales.

The next opportunity to acquire stealth aircraft and fifth generation jets arose with the F-35. Israel joined the program late, in 2003, and so only as a recipient of information during development with a stated desire for 100 airplanes. Their participation was suspended briefly because of Israel's arms work for China. This meant they could not drive general design characteristics. One consequence was that its latest AAM and even the heavy Spice bombs were too long to fit inside the weapon bays. Their suggestions for a dual-seat variant gained no traction. Rising unit cost and program delays became a concern. Other sticking points were, again, access to the system's source code and Israeli industrial contributions. Given the highly integrated nature of the aircraft and the many nations participating, the introduction of unique Israeli equipment in a relatively small number of jets was resisted.

A suitable solution allowed a 2010 contract for the first 19 F-35As (conventional takeoff and landing variant) and simulator for $2.75 billion. Money was found for additional aircraft until the final order was for 50 machines that were then averaging $110 million each for yet another new record. However, it would be a long wait for the aircraft as the design had yet to fly, there were many customers, and work was required to address unique Israeli equipment choices. This last included C^3 and EW systems. The aircraft was also subject to incremental steps to full capabilities via periodic upgrades (mostly software) as development in the USA proceeded. The IASF wanted the underwing fuel tanks, intended for ferry, to be jettisonable with their pylons to regain low-observable characteristics after long-range flight into a combat area. Special versions of the Python 5 and Derby were being developed to fit in the weapons bays, plus adapting the Litening pod for bay carriage.[48] The Israelis particularly pressed for the integration of external fuel tanks.

The single-seat combat jet reversed almost 20 years of IAF devotion to dual-seat combat aircraft and was also another step up in complexity. The Air Force had thoroughly adopted the crew-cockpit concept for strike missions. More than half the attack aircraft fleet were then two-seat machines with approximately half the ordnance employed of Israeli manufacture.

All 40 F-16A/Bs were withdrawn in 2016 to save money while awaiting introduction of the latest fighter. The first F-35Is were delivered at the end of 2016, years late. The slow delivery of the warplanes, the ongoing development of the type, the need to add Israeli systems, and the work-up of tactics, meant it was a year before the first squadron reached initial operational capability with nine aircraft. It was in combat months later. The hope was to have two squadrons operational by 2020 and a force of 75 F-35Is by 2030 with the short takeoff and vertical landing F-35B considered.

The late and slow delivery of the F-35I compelled the IASF to bolster its attack force in other ways. As part of the assistance package agreed to in 2016, the USA transferred 10 used F-15Ds.

The Israelis waited a long time for their stealth fighters. The F-35 was in development when the IAF joined the program in 2003 and initial delivery was at the end of 2016. However, they counted the costly aircraft as important in dealing with capable adversary anti-aircraft systems in conducting effective offensive air operations. (Israeli Air Force)

Additional F-15Ds or advanced F-15Is, the F-15IA, were being considered as attrition replacements or to make up for older F-15s being retired. The earlier F-15Is might then be upgraded to match the F-15IAs to include a radar change. In February 2020, the decision was to seek one squadron each of F-35I and F-15IA. Funds to help pay for the new machines was found, in part, by eliminating Block 30 F-16Cs by closing 110 Squadron in February 2017 and 117 in October 2020. The planned sale of 12 Block 30 F-16C/D to Croatia foundered on the USA demand that all Israeli changes from the baseline airplanes be reversed. All of the F-16C/D squadrons were to be collocated at Ramat David in 2021.

The two Cobra squadrons were united in 2005 to shave costs. However, the TOW was badly dated, even after replacement with the wireless variants. Rather than integrate the Hellfire, the Rafael Spike electro-optical missile was adapted. This offered more warhead options as well as better performance in all conditions, but the guidance package replaced the nose gun and only four rounds were carried. The transition, likely aimed at urban warfare, was made in about 2008 or 2009 and only about half of the helicopters were so modified. Few other upgrades to the second-tier helicopters were funded.[49] Another round of cuts saw the AH-1s withdrawn in 2013 to 2014.

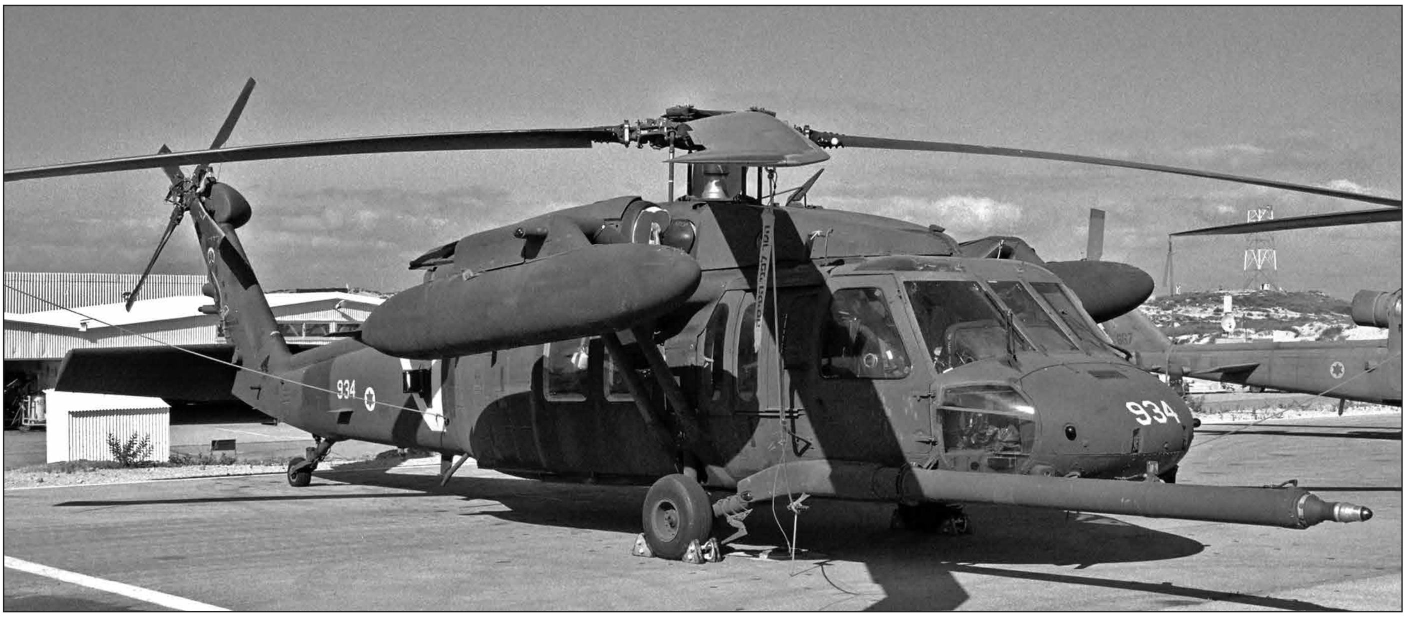
The service was eager to keep the Apaches up-to-date, but could afford few of the upgrades sponsored by the US Army. Yet, the IASF saw the AH-64D Apache Longbow as a potentially significant addition. That aircraft had an uprated engine, improved navigation and communications including datalink, and enhanced survivability. Most evident was a radar housing atop the rotor mast, allowing the helicopter to remain masked by obstacles while searching. The radar could track multiple targets for engagement by a new Hellfire with active radar homing, and the radar data could be passed along to other "shooters." The IASF worked for several years with the MoD to find a funding solution, including borrowing against future American aid. After some vacillation to ensure suitable resources while containing costs – and probably reflecting armed UAVs assuming some workload – the decision was finally taken to buy seven new AH-64D and remanufacture 10 As to Longbow, plus acquire a quantity of Longbow Hellfire. The helicopters would also incorporate an Israeli communication system with SATCOM, mission computers, and self-defense elements.

In 2010, the remaining AH-64As began to be upgraded with some of the features of the D and Israeli enhancements, principally the communications (including SATCOM), datalink, and self-protection subsystems. In 2016-2017, they integrated the Spike missile as replacement for Hellfire.

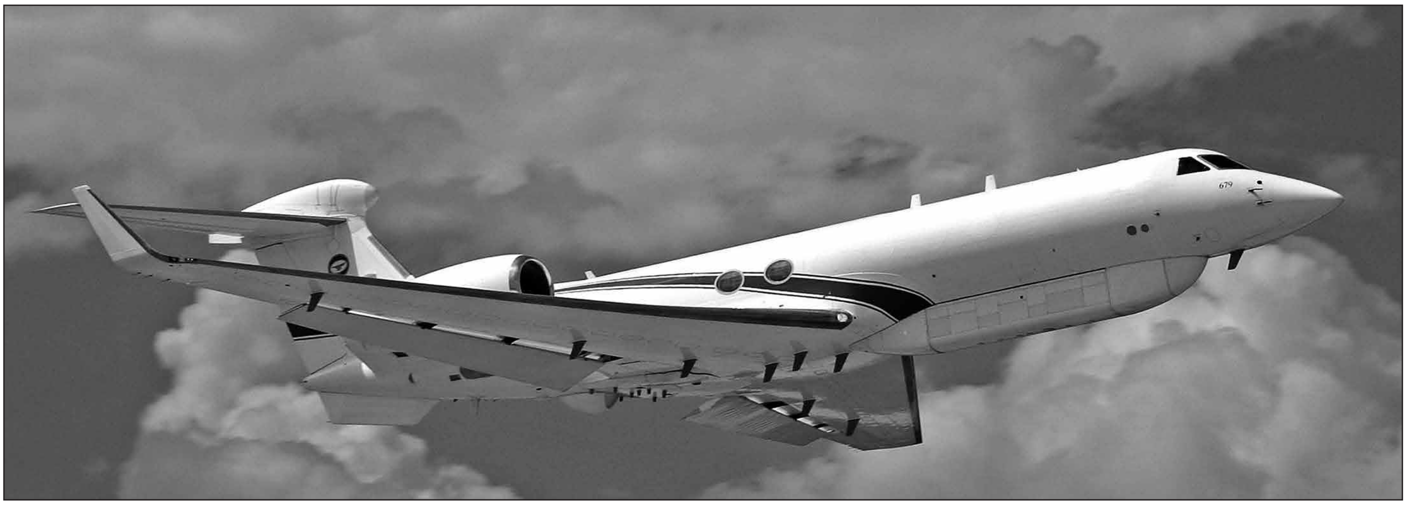
In the meantime, the Black Hawk force was grown with a 24 aircraft buy of UH-60L. These had improved engines and flight controls, moving map display, plus added Israeli avionics and self-protection systems. The rest of the fleet was slowly upgraded to this standard as funding allowed. The IASF also invested in having several fitted with an aerial refueling probe and stub wings for external fuel tanks. The bolstered UH-60/S-70 fleet allowed the Bell 212s to be withdrawn completely.

There were simply no funds to replace the elderly CH-53s. Some of the oldest were set aside as spares sources, others sold, while the remaining helicopters were subjected to another round of upgrades. Running between 2005 and 2015, the program was wrapped-up at 22 airframes, leaving a handful unaffected. This saw dynamic components replaced, more airframe restoration, updated avionics with datalinks and SATCOM, added terrain avoidance system, improved mission computers, and self-protection enhancements.[50] Replacement was not expected to begin before 2019, with full retirement in perhaps in 2025. Although the USA approved sale of the tiltrotor MV-22B or CV-22B in 2013, moving ahead with a deal was delayed until the end of the decade. When procured, these would likely be in a mix of new CH-53K or CH-47F helicopters.

The aged 707 fleet remained a concern, but with no affordable solution. They kept going with avionics and subsystems upgrades that included SATCOM, but a re-engine program was abandoned



In an image from about 2000, this S-70A of 124 Squadron, at Palmachim AB, is fitted with an AR probe and long-range tanks. This was likely intended to support special operations teams, particularly the Air Force's *Shaldag* also based at Palmachim. The KC-130 tankers were retained for just such aircraft. Note the 161 Squadron AH-1 in the background. (Shlomo Aloni Collection)



This Gulfstream G.V was prepared to Israeli specifications to support the SIGINT mission. The airframe modifications were performed in the USA while the electronics installation was done in Israel. Just three "Shavit" aircraft were operated by 122 Squadron at Nevatim AB. (Ofer Zidon Collection)

after the first example.[51] The Boeings probably represented comparatively low readiness and high support costs, but some missions were too essential to go unaddressed. More were converted to tankers.

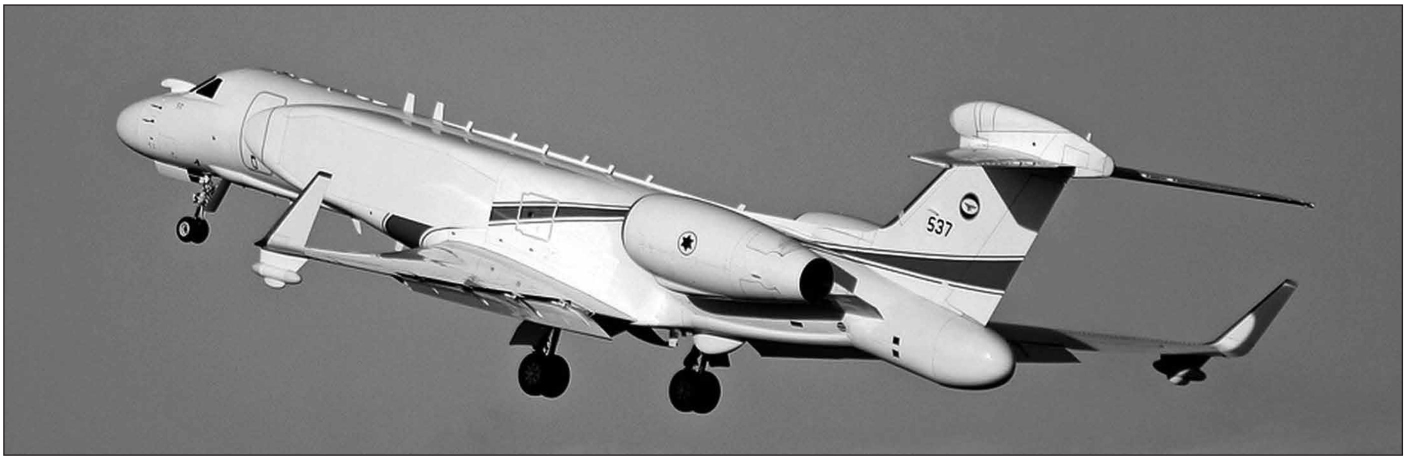
In 2001, the IAF decided to base two missions on modified Gulfstream business jets with mostly Israeli electronics gear. This included AEW using the Israeli conformal-antenna Phalcon technology. The resulting two G-550 "Eitam" aircraft had deep fairings added for the phased-array radar elements. A third airplane was being prepared in 2017-2020. The Signals Intelligence (SIGINT) mission saw a ventral fairing added to the Gulfstream for the G.V. "Shavit." Internally there were operator stations and communications gear. Only three of the very costly SIGINT aircraft were deployed and maintained by IAI, reflecting the narrow scope of IAF missions and theater plus their high cost. Requirement for a Gulfstream fitted with a ground surveillance radar remained unfunded.

The C-130 fleet was also aging. As with the earlier Es, some Hs were parked and cannibalized. The operating fleet was subjected to a slow avionics update and some attention to structure.[52] A few aircraft were observed with an aerial refueling probe added above the flight deck and a FLIR sensor ball under the nose to support special operations.[53] A more comprehensive effort was delayed by the decision to buy nine new C-130J stretched variants to replace the Es and some Hs. Although of higher performance, greatly updated and improved with HUD and digital controls, the aircraft still incorporated some unique Israeli gear. These included self-protection and FLIR (though not routinely mounted). These aircraft were maintained by the Air Force, unlike the rest of the "heavies." They were focused on airdrop while the earlier generation Herks performed AR and heavy lift.[54]

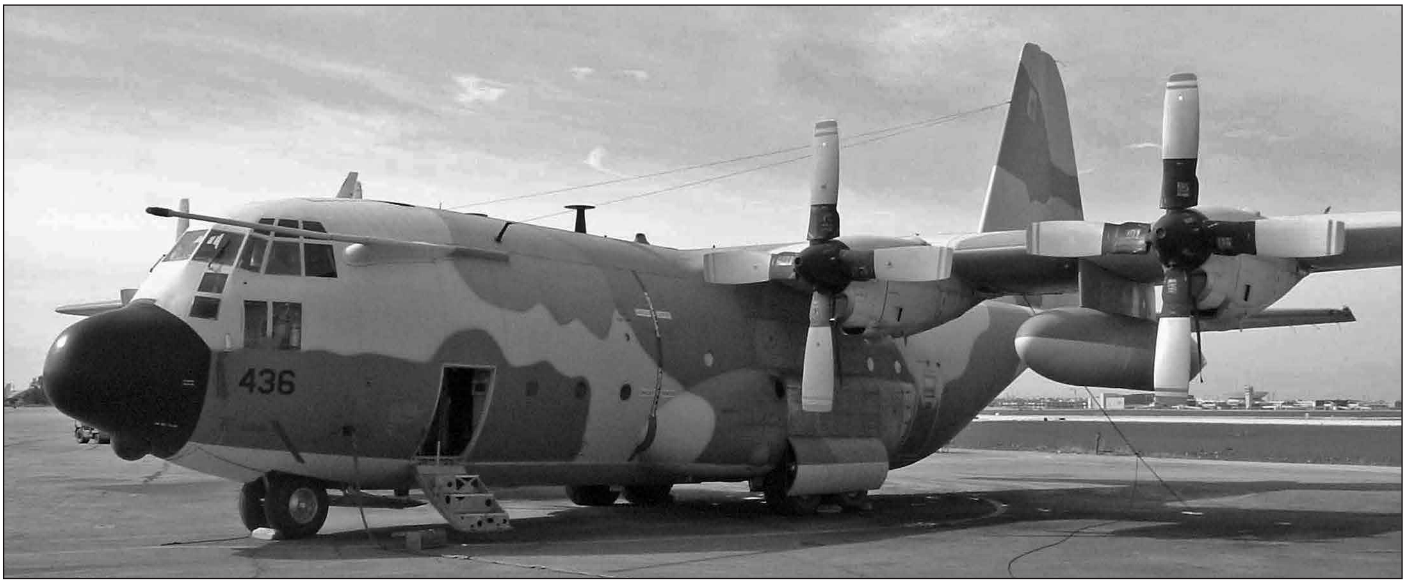
Most IASF heavy transports were fitted with a defensive system in a fairing under the fuselage. These were developed to defend Israeli airliners, detecting the threat via radar then automatically dispense flares.

The Trinidad liaison airplane had not been popular. The IASF finally got its Bonanzas as replacement. Additional King Airs were acquired as well with flight training provided under contract. This Wing continued to contribute aircraft to station flights throughout the country. The last Dakotas were parked after 52 years' service, followed by the Aravas, Queen Airs, the Do.28s, and the Bell 206s except for training.

Savings via more focused pilot candidate selection, reducing the number of trainees, and efficient flight training was sought after 2000. The Cub was replaced after 55 years with a dozen G 120s, leased and contractor-operated, for more efficient screening. The long-lived Tzukit was also finally pensioned-off after 49-years' service. Basic training was performed on the T-6A, maintained by



After a gap of a decade, the IAF restored an airborne early warning capability via two Gulfstream G-550 (a third was to be added about a decade later) modified to take the Israel Aircraft Industries Phalcon system with elements within the fairings that swelled the outer mold-line of the jet. The 122 Squadron flew the "Eitam" aircraft out of Nevatim. (Israeli Air Force)



Making airlift missions to distant locales comfortable for even the C-130, with its long legs, it was rational to add AR probes to a few Hercules. This followed the example of a few other operators who had performed a similar modification. Aircraft 436 is a C-130H that was added to the fleet in 1976 and photographed at Lod AB. It is also equipped with an electro-optical ball, retracted into the nose aft of the radar, to support low-light and low-altitude operations. (Ofer Zidon Collection)

After many years trying to make the budget work, the IASF was finally able to buy new transports with a purchase of nine C-130Js. These are “stretched” compared with the earlier Hercules, but also fitted with aerial refueling receptacles and chin mounts for an EO turret supporting low-light/low-level operations. The aircraft were operated by 103 Squadron. (Ofer Zidon Collection)

contractors. Advanced instruction on M-346s also displaced the last A-4s in 102 Squadron after a 48-year career. The advanced cockpit of this trainer eased the transition into the latest fighters within the force. Simulators also replaced some flight instruction time. The school’s Bell 206s rotorcraft were to be replaced with Leonardo AW119s in 2021.

The IASF unmanned fleet continued to grow as these aircraft provided cost-effective support for missions less suitable for manned vehicles. In 2000, all UAVs, all of Israeli manufacture, came under Air Force control with imagery shared with all IDF users. Upgrades to the UAVs were introduced over time, attrition losses replaced, and payloads under constant evolution as a variety of systems provided capabilities matching unique mission requirements. Satellite links were introduced for beyond line-of-sight operations. All began to take on as much electronic intelligence gathering as image intelligence tasks. Many of the UAV systems were maintained under contract. Missions were demanding a growth beyond the initial corps-level support.

Operations of the Hermes 450S commenced in 2003. This was a High-Altitude/Long-Endurance vehicle with 12 to 24-hour endurance. The 331-lb (150-kg) payload permitted much mission flexibility, from tactical surveillance to strategic reconnaissance given a choice of payloads that included high-resolution panoramic cameras and synthetic aperture radar, or laser targeting for off-board shooters. Yet, the Hermes was believed to have included an armed capability, likely with a Spike-ER missile under each wing.[55] Observers began reporting missiles fired from UAVs in 2004. The IASF had not confessed to operating armed drones to date of writing.

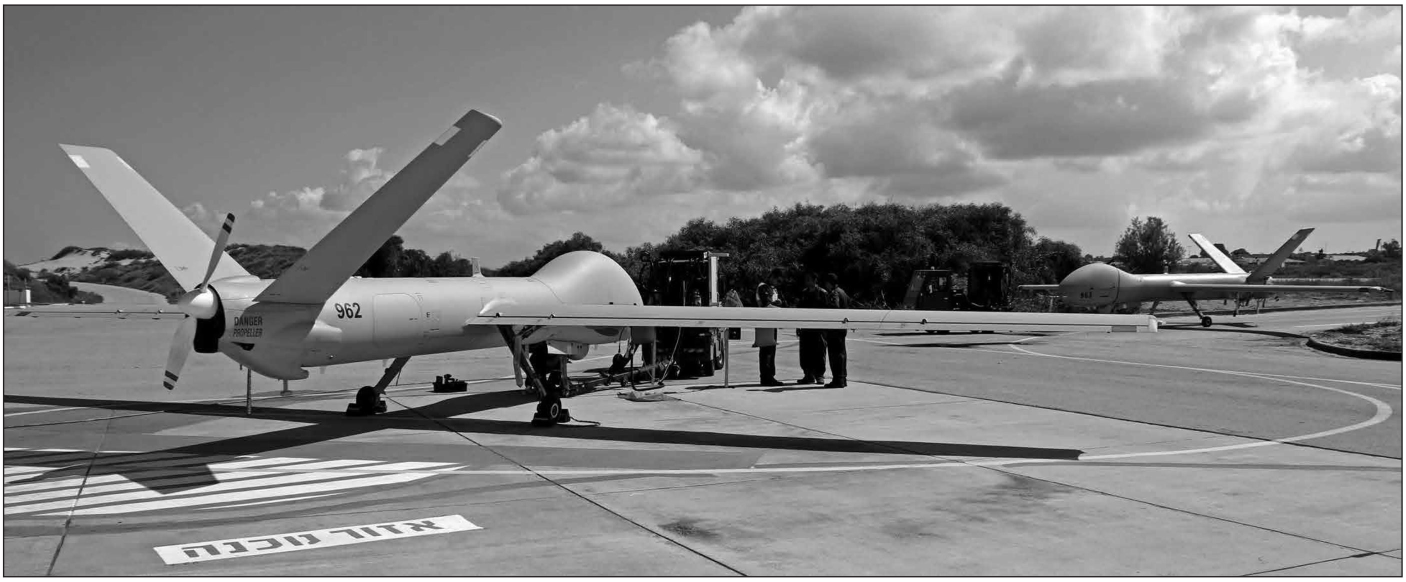
The next generation of UAVs were fully autonomous from takeoff to landing, though with a pilot-override option. They featured retractable undercarriage and dispensed with the arrestment hook. The Heron was procured beginning in 2007

The Air Force had wanted Bonanzas in the 1990s, but cost had precluded a purchase. The pendulum swung the other way in 2004 and the Beechcraft airplanes filled 135 Squadron. This image shows the flightline at Sde Dov AB with the control tower and iconic Tel Aviv power station smoke stack in the background. (Israeli Air Force)

with a 500-lb (227-kg) payload, 30,000-foot (9,144-m) operating altitude, and over 30-hour endurance.[56] The Hermes 900 Medium-Altitude/Long-Endurance UAV was introduced in 2015. This had similar performance with a 700-lb (318-kg) payload, but also SATCOM for very long-range operations. It possessed underwing carriage options and multiple, rapidly interchangeable sensor packages, and was likely optionally armed. The ability to share collected data from these and most other IASF assets in a network-centric IDF, exploiting the best means to counter threats, became essential in the new century.

As the Air Force's UAVs became more sophisticated, operations became split between strategic and tactical missions. Zahal required more responsive portable or squad-serviced mini-UAVs for the latter, plus nano-UAVs for urban operations. Beginning in 2003, the Air Force evaluated and procured such systems, then trained soldiers for operation at the battalion level. However, after a time the Ground Forces began to feel that having all associated very-low altitudes resources fall under their authority would best serve their mission. The Air Force resisted such division and worked to satisfy the needs of its sister service. In 2017, the

Introduced in 2007, the Heron continued the evolution of Israeli UAVs with another step up in payload weight and endurance. These were fully autonomous and with retractable undercarriage. (Ofer Zidon Collection)



The Hermes 900s was introduced in 2015 and accommodated interchangeable sensor packages. These examples appear to be at Palmachim AB and were possibly still undergoing flight test since they lack unit insignia. Could the vacant pylon under each wing mount an air-to-ground missile? (Ofer Zidon Collection)

IASF commander appointed an artillery officer to lead the Heron squadron and a Hermes 450 squadron was essentially devoted entirely to Ground Forces missions with close coordination. However, the separation was inevitable with infantry squads and A'man using systems such as quadcopters for reconnaissance and such things as dropping tear gas canisters on protesters.[57] The Navy was also likely to begin operating shipboard mini-UAVs.[58]

The Gulf War made clear that a less obtrusive and long-range photo-recce platform would be beneficial. In 2010, the large Heron TP "Eitan" began entering the force. This was a turboprop-powered aircraft with a maximum 10,250-lb (4,649-kg) takeoff weight and a typical 2,200-lb (998-kg) mission payload flying for 36 hours or more. Unlike all other UAV units that flew from Palmachim, the 210 Squadron was based at Tel Nof AB where more suitable facilities

In the early 21st century, Israeli UAVs came with more comfortable operating stations, usually within a building. This station likely has the air vehicle operator seated beside the sensor operator. (Israeli Air Force)

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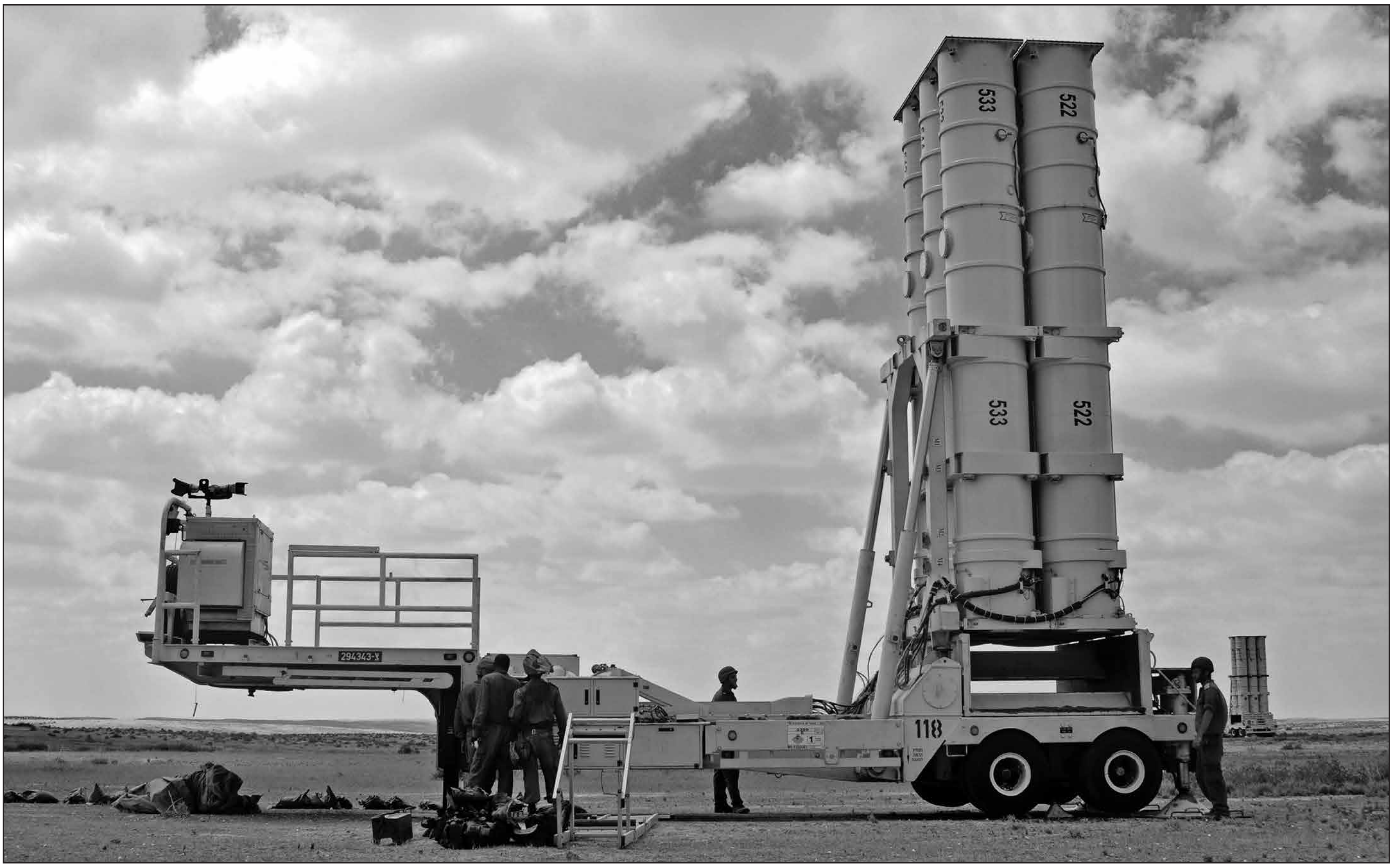
The turboprop-powered Heron TP “Eitan” entered fleet service in 2010. The largest Israeli UAV to that time, it was operated by a new unit, 210 Squadron, at Tel Nof AB and so its operation was mixing in with manned aviation. (Ofer Zidon Collection)

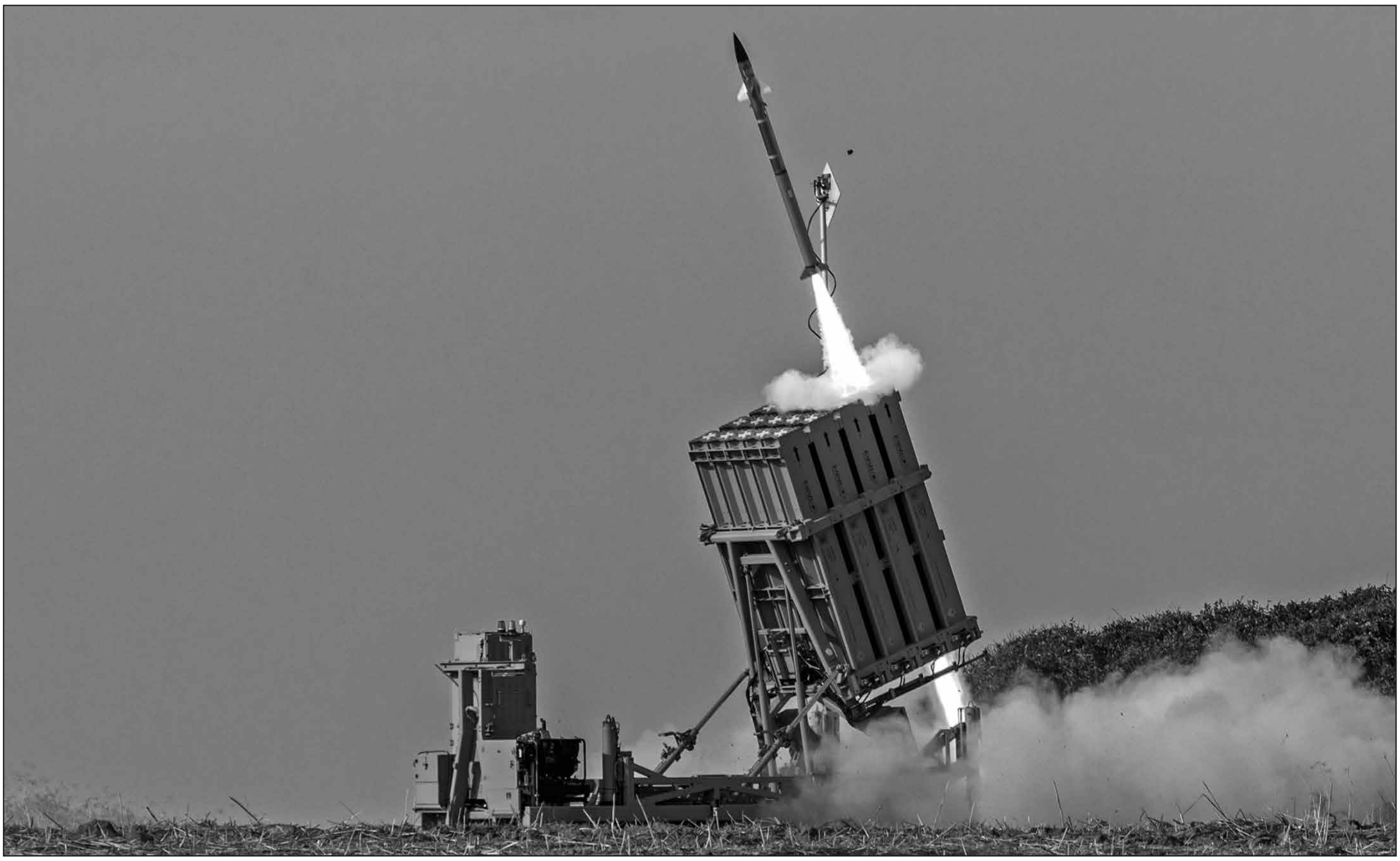
were available. The challenge was then for the IASF to integrated manned and unmanned aviation operations in busy airspace.

Periodic launches of Ofeq satellites aboard Shavit rockets continued, though suffering another failure and loss of Ofeq-6 in 2004, but successes through Ofeq-16 in 2020 (five launches). Seeking larger spacecraft in more favorable orbits became possible as more nations found it acceptable to openly do business with Israel. The 650-lb (295-kg) TECSar (Ofeq-8) with synthetic aperture radar was lofted in 2008 aboard an Indian booster. Since 1996, the Amos communication satellites were launched on foreign boosters. Although aimed at the commercial market, one or more were certainly employed by the state for security and military purposes. The uprated Shavit II was tested in 2005 to accommodate these heavier payloads. By 2020, the country had sent roughly 70 spacecraft into orbit aboard domestic and foreign vehicles. Intentions to develop micro-satellites launched from a fighter aircraft, and most other military space-related ambitions, were abandoned in 2003 owing to budget constraints.

Fixed radar sites built on high ground were the backbone of detection supporting air defense, like this long-standing installation. These were augmented by airborne early warning beginning after the Yom Kippur War, though this suffered lapses owing to funding shortfalls. In the 2000s, additional very capable radars were introduced as elements of the layered defense systems addressing ballistic missile and cruise missile threats. (Israeli Air Force)



Answering the threat of ballistic missiles developed by such belligerent countries as Iran, Israel committed itself to a costly and long-term effort to build suitable defenses. The Arrow 2 missile (shown in its transport/launch container) provided a dedicated anti-ballistic missile capability when initially deployed in 2000. The Arrow 3, operational from 2017, offered exo-atmospheric intercept. The IASF's Air Defense Command operated all these systems. (Israeli Air Force)



The decades of inexpensive rockets fired by Muslim and Palestinian irregulars across the Gaza and Lebanese borders tormented generations of Israeli residents on the receiving end. There was no suitable Air Force response and an enormous ground force presence would be required to push the launchers out of range. In answer, the Iron Dome system was fielded in 2011 and was immediately effective in almost nullifying the threat. (Nir Ben-Yosef Collection)

The Arrow 2 ABM was initially deployed in 2000, about five years late, and underwent continued improvement. The Arrow 3 was an exo-atmospheric interceptor reaching initial deployment in 2017. The middle tier of air defense was David's Sling that also went operational in 2017 to begin replacing Hawks and Patriots. The lower tier defense against short-range rockets and shells, Iron Dome, became active in 2011. This was almost immediately busy destroying hundreds of Hamas rockets with high reliability. Given all these elements, Israel possessed among the most capable and comprehensive air defense system in the world – possible given its very small dimensions and narrow sources of hostile fire. The renamed Air Defense Command was more important than ever and admired by the public that had previously taken little notice. Such capabilities would affect political decisions to send the Air Force out on long-range and controversial strike missions to attack threats that might be neutralized by air defense missiles.

In 2021, within a few short years of its 75th year, the IASF's aviation arm was the leanest and most modern of its existence, with the least number of aircraft and squadrons in 40 years. Yet, it was still an unusually large force for the region. The days of the Israeli Air Force operating quaint old airplanes beyond retirement were in the past. Likewise, in the past are the sight of aircrew with faded, sweat-stain flight-suits unzipped to the naval revealing chest hair, and other personnel poorly uniformed and with non-regulation haircuts. Aircraft regalia, uniform accoutrements, and world-class facilities proliferated as motivation for newer generations. Yet, the large number of reserve personnel and addressing officers by their first names remained unique features of the force. (Some data in the following tables are best estimates.)

Attack
21 F-35I (ongoing delivery of 50)[59]
73 F-15 (14 A, 6 B, 16 C, 12 D, 25 I)
177 F-16 (30 C, 49 D, 98 I)[60]
53 AH-64 (36 A, 17 D)
6? Hermes 450S (optionally armed)
3? Hermes 900 (optionally armed)
Electronic Warfare
4 Boeing 707 ELINT, COMINT, EW, C^3
2 EC-130H ELINT and ECM
7 RC-12 (5 D, 2 K)
3 G.V Shavit (SIGINT)
2 G-550 Eitam (AEW, a third being prepared)
Reconnaissance/Surveillance
-- – camera pods for several F-15 and F-16
6? Hermes 450S UAV (losses continuously replaced)
24? Hermes 900 UAV (losses continuously replaced)
9? Heron UAV (losses continuously replaced)
6? Heron TP UAV (losses continuously replaced)
3 Aerostats
Aerial Refueling
5 Boeing 707 (boom)
3 KC-130H (hose-drogue), some dormant
Maritime Patrol
4 Heron 1 UAV
Transport and Assault
4 Boeing 707 cargo/passenger, VIP, hospital
16 C-130H/J (7 H, 9 J)
23 Super King Air
19 Bonanza
21 Yas'ur 2025 and 5 Yas'ur 2000 (upgraded S-65 and various models of CH-53)
49 S-70/UH-60 (10 UH-60A, 39 UH-60L)
Maritime Helicopter
5 AS.565MA
(8) SH-60F (2020 delivery to replace AS.565)
Training
30 M-346
20 T-6A
16 Grob G 120
6 Bell 206/OH-58 (to be replaced)
(12) AW119Kx (on order to replace Bells)
Ballistic Missile
50-100 Jericho III
565 total aircraft

Haifa (Wing 21)	
-- – occasional flights	
Hatzerim (Base 6)	
69 Hammers	F-15I
107 Knights of the Orange Tail	F-16I (moving to Ramon)
(123 Desert Owls)	UH-60A/L training flight
102 Flying Tigers	M-346
Air Force Academy	T-6A, Grob G 120, King Air, Bell 206, UH-60
Hatzor (Wing 4)	
100 Flying Camel	RC-12, King Air, Bonanza (some of last two in station flights across the country)
101 First Fighter	F-16C (moving to Ramat David)
105 Scorpion	F-16D (moving to Ramat David)
Nevatim (Base 28)	
103 Elephants	C-130J
116 Defenders of the Negev	F-35I
120 Desert Giants	Boeing 707
122 Pioneer	G.V, G-550
131 Knights of the Yellow Bird	C-130H
140 Golden Eagle	F-35I
Ovda (Wing 10)	
115 Flying Dragon	F-16C, Bell 206
Air Training Center	115 and visiting squadron elements
Palmachim (Base 30)	
123 Desert Owls	UH-60A/L
124 Rolling Sword	UH-60A/L
161 Southern Cobra	Hermes 450S (optionally armed)
166 The Spark[61]	Hermes 900 (optionally armed)
200 First UAV	Heron (UAVs also operated from forward airports)
UAV School	Dror and likely others
Ramat David (Wing 1)	
109 Valley	F-16D
(113 Hornet)	AH-64D readiness flight, 2-4 aircraft
193 Defenders of the West	AS.565MA (to be replaced with SH-60Fs in 2021)
(190 Magic Touch)	AH-64A readiness flight, 2-4 aircraft
Ramon (Wing 25)	
113 Hornet	AH-64D
119 Bat	F-16I
190 Magic Touch	AH-64A

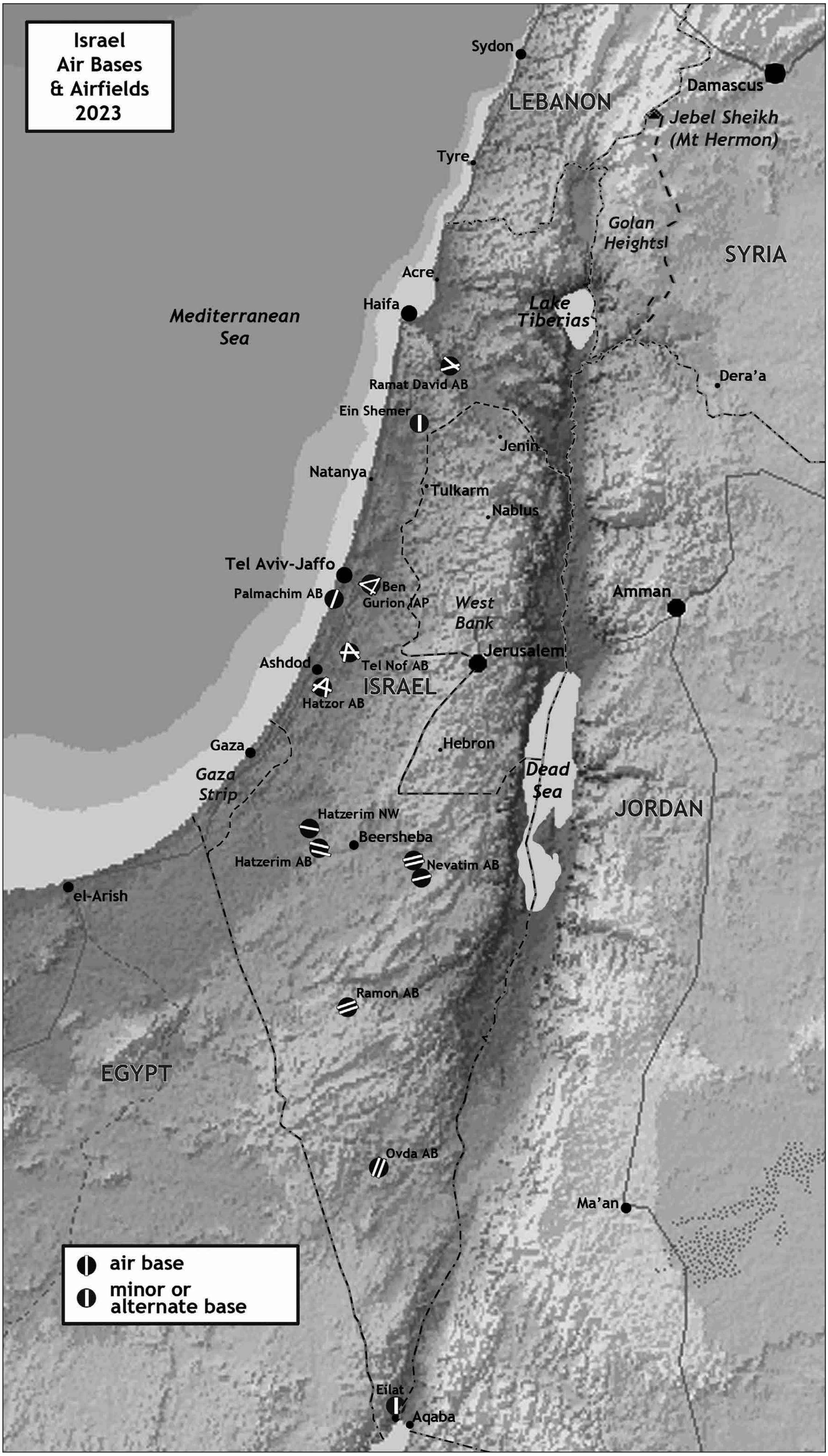
201 The One	F-16I
253 Negev	F-16I
Sdot Micha (Wing 2)	
150 (unvertified)	Jericho III
Tel Nof (Base 8)	
106 Spearhead	F-15C/D
114 Night Leaders	Yas'ur
118 Night Predators	Yas'ur
133 Twin Tail	F-15A/B
210 White Eagle	Heron TP, Hermes 900[62]
601 MANAT – Flight Test Center	F-15, F-16, F-35
669 Aeromedical Evacuation Unit	on-call CH-53, UH-60, AS.565MA

Israel's space ambitions found popular expression with the flight of 48 year-old Colonel Ilan Ramon on the NASA shuttle mission STS-107 aboard *Columbia* as a payload specialist. He'd graduated pilot training in 1974 and flew Mirages, A-4s, and F-4s. His principal mount was the F-16 in which he participated in the attack on the Iraqi nuclear reactor and later commanded 117 Squadron. The *Columbia* reentry accident that took the lives of the entire crew on February 1, 2003, was as much a shock to Israel as it was to the United States.

Dani Haloutz is made the IDF Chief-of-General-Staff, with the grade of lieutenant-general, in a June 1, 2005, "pin on" ceremony with Prime Minister Ariel Sharon and Defense Minister Shaul Mofaz. The first CGS to emerge from the Air Force in the "modern era," Haloutz had served as IAF commander from 2000 through 2004. (IDF Spokesperson via Ofer Zidon)

14th Commander – Dani Haloutz earned his wings in 1968. After OTU on Ouragans, a few months with Mystère IVAs and then Vautours, he was assigned to fly the new Phantoms in December 1969. He flew many difficult missions with 201 Squadron during the War of Attrition. In 1971 he became a flight instructor and served a period at HQ beginning in 1972. Haloutz was discharged in 1973, but flew again with 201 in the Yom Kippur War as a reservist where he scored three kills. Remaining in the service, he rose to deputy commander. Rejecting a headquarters position he did not consider suitably challenging, he was discharged in 1978 and completed his college degree. The officer returned to regular service again in 1982 for the war in Lebanon. Afterwards, Haloutz was retrained on F-16s and began staff duties, heading the Weaponry Department in 1983. In 1984, he took command of 107 Squadron, back on Phantoms. Two years later he returned to AHQ to begin planning operational introduction of the Lavi before heading the Operation Requirements Department. Haloutz then commanded the Hatzor wing from 1991, but two years later was named head of the Air Group and then led the Headquarters. In 1998 he became a general with the role of assistant head of the GHQ Operations Department and a year later, after a reorganization, head of the Operations Directorate. He took the top Air Force job in April 2000. In 2004, Haloutz was appointed IDF Deputy Chief-of-General-Staff and, in June 2005, the first CGS emerging from an Air Force aircrew career. There he served until 2007, forced out early by the IDF's mediocre performance during the 2006 war in Lebanon.

No matter how costly and rare the aircraft, they are still operated by fallible humans and subject to mechanical breakdown or the effects of the elements. The IASF was as professional as the leading Western air forces by 2000, training its aircrews with excellent facilities and suitable flight time, and had outstanding maintenance and airfield support. But, sometime the worse happened. On July 19, 2006, one of the expensive F-16Is from 119 Squadron at Ramon AB was lost when a tire burst during the takeoff roll and the aircraft veered uncontrollably. The pilot and navigator ejected safely, but the aircraft was destroyed. Two more F-16Is were lost in following years, one due to a weight imbalance and another after an engine failure. In 2018 a 201 Squadron F-16I, aircraft 868, was shot down by a Syrian SAM, attributed to a failure to operate suitable countermeasures. That same year, a 119 Squadron F-16I lost brakes and ended up off the taxiway, though with minor damage.


Israel
Air Bases
& Airfields
2023
Sydon
Damascus
LEBANON
Jebel Sheikh
(Mt Hermon)
Tyre
Golan
Heights
SYRIA
Acre
Haifa
Mediterranean
Sea
Lake
Tiberias
Ramat David AB
Dera'a
Ein Shemer
Jenin
Natanya
Tulkarm
Nablus
Tel Aviv-Jaffo
Ben
Gurion IAP
Palmachim AB
West
Bank
Amman
Jerusalem
Ashdod
Tel Nof AB
ISRAEL
Hatzor AB
Gaza
Hebron
Gaza
Strip
Dead
Sea
JORDAN
Hatzerim NW
Beersheba
Hatzerim AB
Nevatim AB
el-Arish
Ramon AB
EGYPT
Ovda AB
Ma'an
air base
minor or
alternate base
Eilat
Aqaba

As a result of budget cuts and reduced threat, by its 75th anniversary the Israeli Air Force had the fewest air bases in some 40 years. This was in concert with a slow reduction on the number of aircraft, but also the diminishing significance of range from the borders given modern aircraft compared with past generations. Note that Lod was eliminated in 2009 and Sde Dov in 2019. (Tom Cooper)

Foreign Welcome

Since the early 1990s, the IAF occasionally participated in exercises, competitions, and training in the United States and Canada. This grew in the 2000s to include some in Europe. In 2001, the IAF sought permanent basing of some fighters in the USA for training in less restricted airspace.[63] However, it created its own Air Training Center in 2005, with a large Negev range and enemy threat simulators. Israel began welcoming foreign airpower teams to train there as well. It freed the IAF from flying overseas to gain such training, and friendly nations sent combat teams to Ovda AB to train for a fee in Desert Hawk and Blue Flag exercises. This permitted the Israelis to observe and possibly adopt the best of what its contemporaries demonstrated. However, the small airspace in Israel and the benefits of association with others saw the IASF continuing to send elements abroad for training. Understanding the 21st century trend for coalition forces, these relationships became important and Israel fostered an association with the North Atlantic Treaty Organization (NATO).

As its urgent defense obligations leveled-off, the Air Force was able to offer transports for disaster relief operations around the world. These employed its fleet of 707s and C-130s, and even Gulfstreams. They flew in supplies as well as highly qualified emergency response personnel with their equipment. This saw the IASF roundel appearing in many lands while displaying Israeli generosity and comparable wealth. In other cases, the aircraft evacuate Israelis and Jews from unstable situations such as government collapse or terrorism alerts.

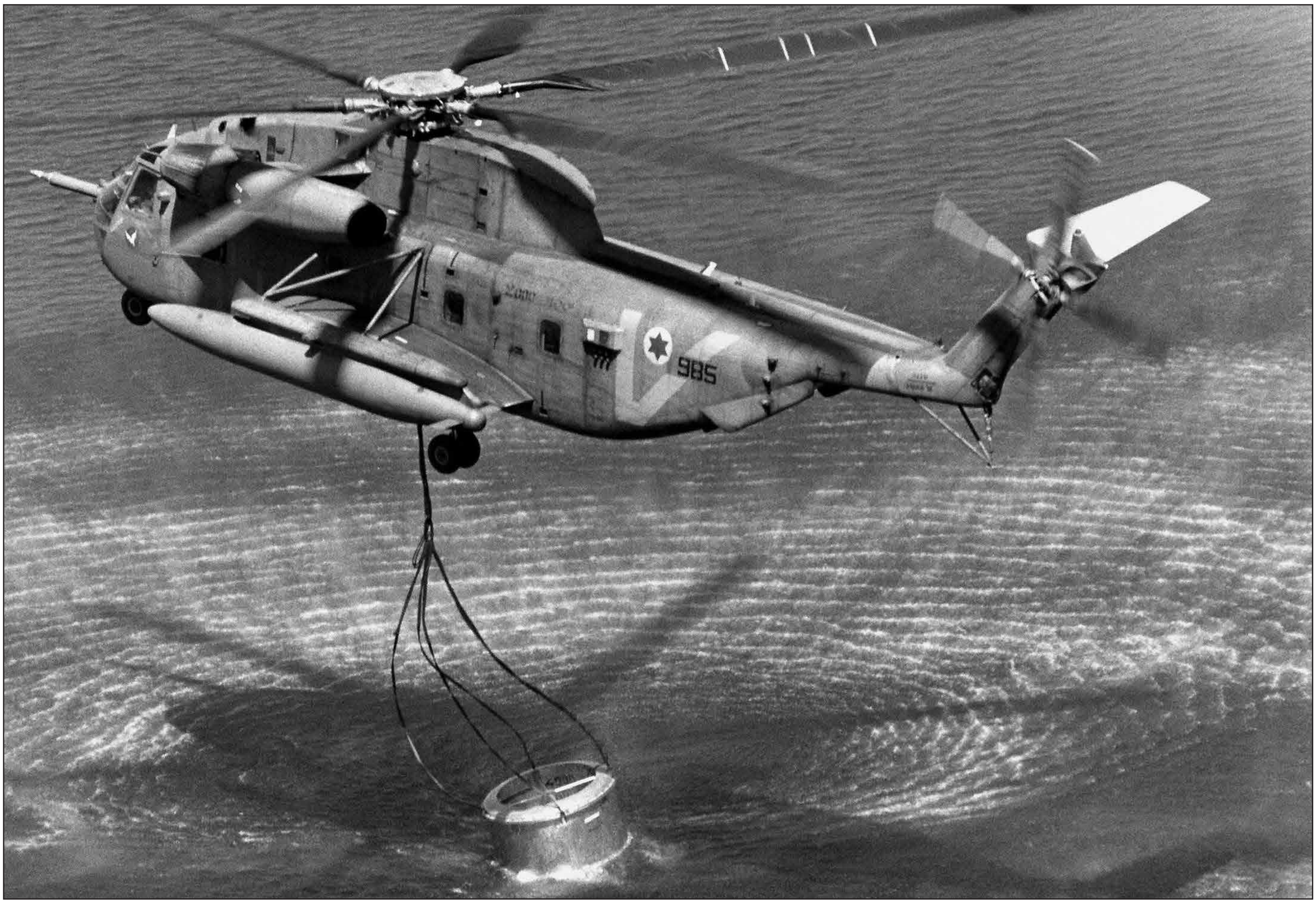
A forest fire that raged in Israel for three days in 2010 took the lives of 44 persons and required the assistance of foreign firebombers. The Air Force's Bell 212s had performed water drop missions followed by CH-53s in the 1990s – to include assisting Cyprus and Greece – but this was discontinued because of the excessive stress on the airframes. While awaiting funds to procure CL-415 water bombers, the government chose to buy seven Air Tractor water-drop airplanes in 2011. Two were initially on floats, but these were soon replaced with the standard tricycle undercarriage. These became the responsibility of the Air Force that formed 249 Squadron. However, the aircraft were frequently based at civilian airports, maintained by contractors, and ultimately flown by contract pilots before the police assumed responsibility.[64] In 2016, the aircraft were broken out of the IASF, making the 249 Squadron among the shortest-lived aviation unit in Air Force history. Late that same year a series of forest fires erupted across northern Israel. Still without CL-415s, foreign assets again supplemented the Air Tractors. The MoD bought six more aircraft in 2018, though they continued to be operated under a commercial contract. This possibly suggested that the CL-415s were no longer being pursued.

Asymmetry

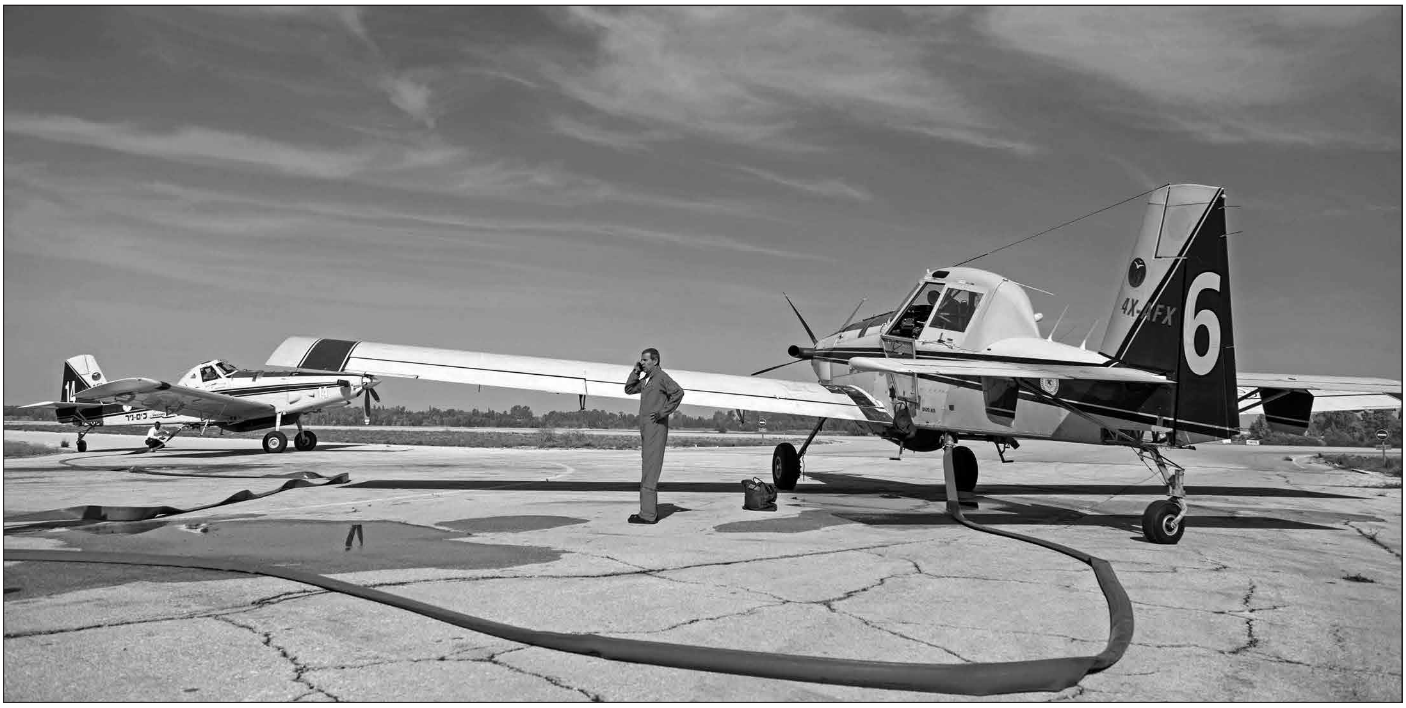
Since 1967, Israel's air force was considered among the most capable and experienced in the world, and certainly the best in the region. Yet, in employing the force after 1968, the nation's leadership had to be somewhat responsive to the realities of American willingness to finance a large portion of the equipment acquisitions and its pressures to restrain operations for the sake of its own foreign policy objectives. Sometimes the provocation or threat was too great for Israel to withhold a military response. In such cases, the IAF was frequently unleashed. However, after 1974 these became greatly one-sided affairs.

By 2000, Israel faced no peer adversary in the region and most military operations were asymmetrical in nature – the IDF greatly superior in all respects. Any attacker would have to accept deep suffering at the hands of the IASF if not IDF ground forces. Saudi Arabia was the best equipped and openly contemptuous of Israel, but showed no hostile intent. The regional problem of Islamic fundamentalism sustained the terrorist scourge while progress towards peace and improved relations with past antagonists reduced the conventional threat. Yet, the Palestinian and Islamic militias, plus political organizations in the Occupied Territories and Lebanon, saw benefit in bringing Israel to battle on occasion for political ends. Farther afield, the threats of Iranian long-range

The IAF created an Air Training Center in 2005 at the remote and under-utilized Ovda AB. Equipped with threat simulators and an "aggressor" squadron, the Center relieved some of the need to send air combat teams aboard for exercises. It also permitted foreign teams to train in Israel, providing income and permitting the IASF to observe how others solved combat problems. There in 2017, this Israeli F-16I approaches a pair of Greek F-16s beside the air base facilities. (Israeli Air Force)



The IAF performed civil duties throughout its existence. These had largely fallen to the helicopters after their advent. Among these was firefighting as depicted here by the CH-53 using the helicopter bucket to collect water (probably from Lake Kinneret) for release over a fire. The aircraft has the badge of 118 Squadron and the Yas'ur 2000 stencil for which the self-defense modifications are evident. (IDF Spokesperson via Ofer Zidon)



The capable and respected IASF was again compelled to respond to a civil need by adopting firefighting aircraft in 2011. Seven Air Tractor machines were purchased and the 249 "Elad" Squadron formed at Sde Dov AB. However, the Fireboss aircraft were commonly based at civilian airports across the north of the country – this example seen at Megiddo airport in 2016. The aircraft were passed to a civilian organization in 2016 and the MoD further expanded the fleet. (Israeli Air Force) ballistic missiles and incipient nuclear capability, accompanied by virulent anti-Israeli rhetoric, was cause for great concern. These very different threats separated by hundreds of miles shaped IASF equipment and training choices.

Application of military force against Syria and its elements in Lebanon were infrequent and without decisive intent. The IAF struck Syrian radar stations in Lebanon on April 16 and July 1, 2001. These were the first deliberate moves against Syrian forces in 15 years and were made in response to Hezbollah aggression from Syrian-controlled areas.

Syria was compelled by the world community to pull-out of Lebanon in 2005 after being implicated in the murder of several national leaders. Yet, she continued supporting Hezbollah and its activities in southern Lebanon. Israel made clear its discontent with Syria's actions by having F-16s "buzz" the Presidential residence in Latakia in June 2006. This was a repeat of an August 2003 event in which IAF jets laid sonic booms and overflew Damascus. A years-long Syrian civil war began in 2011 and caused widespread destruction, generated an enormous wave of refugees, and was the breeding ground for radical groups like the Islamic State. However, even this profound internal conflict did not dissuade Syria from continuing its active support of Hezbollah, usually with financing and weapons supplied by Iran.

On July 14, 2006, Hezbollah fired Chinese-made anti-ship missiles at the Israeli Sa'ar 5 corvette INS *Hanit*, patrolling off Beirut. Four sailors were killed and the vessel plus its AS.565MA helicopter badly damaged. Although the successful strike was largely due to the *Hanit*'s missile defenses being shut down, the event demonstrated the ability of an undetected and destabilizing weapon to complicate Israel's efforts to contain Hezbollah and protect its citizens. Consequently, there were reactions when such weapons were known to be in transit or inside Lebanon.

Iran admitted to transferring over 11,500 short- to medium-range artillery rockets to Hezbollah, and working to emplace many of the launchers plus train crews. Israel made clear through several means that there were understood lines across which Hezbollah and its patrons should not cross without risking punishment. These included long-range missiles and unconventional munitions. When Syria began moving SA-17 missiles into Lebanon, this was one such provocation. Israel would not permit such a sophisticated anti-aircraft system complicating its air activities. The convoy was bombed on the night of January 31, 2013, while still inside Syria. Airstrikes on a warehouse at the Damascus airport during the night of May 3, 2013, was aimed at Iranian long-range missiles capable of reaching deep into Israel with a sizable warhead. Another attack the following night hit storage facilities north of the city targeting the same missiles that Israel could not risk being transferred to Hezbollah. All of these attacks may have been conducted using stand-off weapons released from beyond the Syrian border.

Air Force actions in Syria continued into 2017, some 20 or more in total if foreign reports are accurate, and most involving overflights. These struck convoys transporting arms to Hezbollah, weapon storage facilities, or Hezbollah and Iranian training activities. Israel would usually not confirm or deny its role in these events so as not to give Syria the need to react as a face-savings measure. That all these missions were flown at night, and were apparently successful, highlighted the value of the nocturnal combat capabilities the IASF had grown over 25 years and its ability to evade air defenses. The introduction of Russian aviation and S-400 anti-aircraft system into the Syrian civil war in late 2015 complicated Israeli mission planning. A March 2017 strike saw SA-5s fired at the attackers, and one was struck by an Arrow.

Syria warned it would fire Scuds into Israel if she persisted. Yet, the IASF began operating over Syria on an almost daily basis, and a hotline was established with Russian air force elements in the country for deconfliction.[65] From the beginning of this period of conflict through May 2018, the Air Force struck targets in Syria on some 200 occasions, and mostly at night.[66] Israel destroyed a Syrian fighter that strayed across the border in 2014 and again in July 2018, both by Patriots missiles. A February 2018 strike saw an F-16I hit and go down inside Israel, reportedly due to an

Advanced helicopter flight training came to include the UH-60 given how comparatively easily it was to fly – and because the budget supported no substitute. The pilots streaming to attack machines trained on the Cobra beginning in 1997 until the type was withdrawn in 2014 for economic reasons. The AH-1E (still in US Army pigment) wears the School badge while the Black Hawk is from 125 Squadron. (Ofer Zidon Collection) operational error. This first combat loss since 2006 (discounting unmanned aircraft) occurred during discussions to use artillery rockets to strike targets within 300 miles (483 km) and preserve aircraft resources.[67] The shoot-down was followed by IASF attacks on SAM batteries and other air defense sites. Iranian assets and forces began to be struck more regularly. They responded with rocket fire, only to receive additional Israeli bombs in return.

Second Lebanon War

Hezbollah ostensibly maintained the confrontation with Israel over its continued occupation of the Shebaa Farms area and routine violation of Lebanese airspace after the security zone pullout in 2000. Responding, Israeli military actions in Lebanon surely numbered in the hundreds. They ramped up during periods when the group sent scores of rockets across the border or there were other provocations such as assaulting IDF personnel and assets.

In summer 2006, the conflict escalated again to a war. The IDF sought to degrade Hezbollah's ability to launch rockets and terrorist forays, destroy their storage and delivery systems, crush their transportation and communications network, remove its leadership, strangle the will to resist, and alter the fundamentals that permitted the organization to operate freely. At that time a former IAF commander, Lieutenant-General Dani Haloutz, was the IDF Chief-of-General-Staff. Haloutz championed employing stand-off weapons, primarily air-delivered, as the principal means of achieving these ambitious goals without the need for a large ground campaign. This followed the pattern of American and NATO operations in the prior decade.

Starting July 12, nearly a month of air operations ensued along with minor ground forces incursions. Naval gun and missile fire, ground-to-ground rockets, and artillery also contributed. Israel blockaded the country by sea and air. The IASF reported that most of the long-range rockets and more than half of the medium-range rockets were destroyed in the first hours. Yet, short-range rockets continued to be fired at a high rate for which the service was poorly suited to counter. A quarter million Israelis were temporarily displaced and the same number spent long periods in shelters. The Air Force was running out of targets, yet the volume of indiscriminate rocket fire across the frontier barely slackened.

Because Hezbollah was then part of the Lebanese government, attacks on national infrastructure were assessed as appropriate in undermining support for the organization. So judged, the Air Force extended its strikes to such assets. It destroyed some 400-miles (644-km) of roads, 73 bridges, port facilities, water services, utilities (sewage and electrical), 25 fueling stations, 900 commercial structures, 15,000 homes, and damaged some 130,000 more buildings. The area of Beirut that housed Hezbollah administrative buildings was laid waste. The national airport was also struck to include fuel storage and the runways. Destruction of a Beirut power station caused an ecologically damaging oil slick. Approximately one million Lebanese were displaced during the fighting, yet bombing errors killed many civilians. Some $2 billion in damage was wrought, but few of the expected benefits of the air campaign were realized. Israel was strongly condemned for what appeared to be, for a second time, destroying Lebanon and imposing great pain on the nation well beyond affecting the terrorists.

The Israeli cabinet reluctantly approved a ground offensive to root out the terrorists and destroy their tactical equipment. However, this progressed relatively timidly while suffering surprising losses. For the first time, C-130s performed low-level airdrops in combat and helicopters vertical resupply, though only because the Army was unable to establish secure logistics routes to forces just a few kilometer beyond the border. The IASF also supported with CAS and reestablishing tactical air controllers in the brigades. Many CAS strikes were defined as "danger-close" or within 2,000 feet (600 m) of friendlies, and as close as 650 feet (200 m).[68] Overly cautious ROE impacted effectiveness, an example being that the IASF was loath to send attack helicopters as low and close as ground force commander desired.

There were air assaults to attack specific concentrations of enemy fighters and rockets. One was to be the largest in IDF history and employing nearly the entire helicopter fleet executing a night insertion. Some 200 paratroopers were landed in the first lift. However, after a CH-53 was knocked down, with the crew of five perishing, the lift was cancelled. The soldiers left on the ground hid for two days before marching out. Israel accepted a ceasefire after just three days of the ground campaign and before much substantially material had been achieved.

Some 3,970 rockets fell on Israel, approximately 901 in residential areas, damaging 12,000 buildings and killing 43 people while wounding 4,262. Perhaps 1,191 Lebanese civilians were killed and 4,405 injured. The IDF estimated it destroyed 1,600 rockets and 300 launchers – perhaps 25 percent of the stockpile. Zahal reported 118 soldiers killed and over 400 wounded as trade for some 700 enemy killed and 1,000 wounded.

The IASF flew the largest sustained campaign of its existence with 18,900 sorties during the 34-day action. This broke down to 11,600 fighter-bomber sorties (8,200 strike), 2,500 by attack helicopters (700 strike), 2,000 by assault and utility helicopters, 1,300 mobility (about 90 airdrop missions), and 1,500 intelligence, surveillance, and reconnaissance (ISR).[69] For the first time this was an around-the-clock operation – half the strikes delivered at night – and the most complex the service had waged. Of a total 48,500 hours flown, 19,150 or a remarkable 40 percent were ISR as especially the UAV fleet (16,500 hours and 1,350 sorties) was busy ceaselessly searching for rocket and personnel targets.[70] The conflict may have been the first use of armed UAVs by the IASF as they could strike immediately before the target moved while manned aircraft were being diverted to the identified location. The G-550 AEW, though still in flight test, was busy coordinating the operations of a great many aircraft in so small an airspace. Some 2,700 targets with 7,000 aim points were prosecuted with 21,700 weapons of which 36 percent were PGMs and 1,070 delivered by gunships.[71] Fighter-bombers released ordnance from medium-altitude to remain beyond range for AAA and man-portable SAMs. Yet, the number of rounds delivered meant that within 10 days the IASF was seeking replenishment of some weapons from the USA and even jet fuel.[72] Previously ordered 5,000-lb (2,268-kg) GBU-28 "bunker-buster" LGBs were rushed to Israel to penetrate deeply buried facilities. Three Apaches were lost and three crewman killed in operational accidents during combat. An F-16I was also lost in a mishap plus three Hermes 450s.

The use of stand-off PGMs against a dispersed, unconventional force was not decisive. In a short time, the airmen destroyed the principal Hezbollah targets and soon most other objectives including non-military. It rapidly became clear that only a ground offensive would greatly reduce the rocket threat. Yet, the government judged that Israeli society was unwilling to suffer the casualties that might result over a protracted operation. Furthermore, successive budget cuts and responding to the Intifadah (*q.v.*) had degraded IDF tactical skills as no large-scale maneuvers or many other joint-service exercise had been conducted in years, to include close coordination with the Air Force.

The campaign was launched with much interference from higher authority and loose adherence to orders. Public bickering and "back-stabbing" in the press by generals and other senior personnel was a disquieting spectacle. The old practice of retired generals hanging around command posts during combat to offer advice was becoming unacceptable. The Army was largely unprepared to meet Hezbollah on its own ground and its performance was assessed as lackluster. By the time the ground operation started there was already great pressure for a ceasefire. North of the Litani River, the IASF was responsible for all operations – the first time in its history it held operational theater command. South of the river operations were directed by Northern Command, as in the past. Both were found wanting, especially as the Air Force CO tended to want to direct all air actions and the Zahal GHQ intruded frequently. This particularly reduced the effectiveness of attack helicopters. Several senior officers subsequently resigned, including Haloutz. The nation, again, questioned whether it had neglected the ground forces while investing so heavily in the IASF and its air defenses that proved incapable of stopping the rockets.

The ceasefire resolution required the IDF to withdraw, foreign powers to cease sending arms to Hezbollah, the organization to disarm, and the Lebanese army to occupy the entire south along with a greater role for UN forces in preventing Hezbollah from firing rockets. There were no measures to enforce these terms and, apart from the IDF pulling out by October, the terms were either not enforced or proved temporary. Hezbollah spun the war's outcome into a victory but took time to recover militarily. Although billions of dollars in Iranian-supplied weapons were destroyed, it continued to send arms and personnel to the region. However, there were only rare rocket attacks through 2020, in small numbers and by groups unaligned with Hezbollah – an unprecedented period of relative quiet for Galilee.

Perpetual

A second and more violent Intifadah began in 2000 that lasted several years. With failure of final status talks, the PA decided that constant pressure on Israel would compel her acquiescence, as it appeared to have done for her withdrawing from southern

Major-General Elyezer Shkedy (right) poses beside the IDF Chief-of-General-Staff, Lieutenant-General Moshe Ya'alon, following a flight in an F-15I. (Ofer Zidon Collection)

15th Commander – Elyezer Shkedy graduated flight training in 1975. He was soon a 102 Squadron A-4 pilot before moving to delta wings with an assignment to 253 Squadron at Eitam AB. In 1980, the officer transitioned to F-16s and served with 117 at Ramat David AB. A year later, he began a rotation as Flying School instructor and was soon leading of the advanced stage training. During the first Lebanon war in 1982, Shkedy downed two Syrian aircraft. After college, he returned to Skyhawks, acting as deputy CO of 116 Squadron at Nevatim AB. He was then called on to help reestablish 101 as an F-16D outfit at Hatzor, remaining as a deputy CO. Shkedy returned to Hatzerim AB in 1989 to lead the fighter pilot course. His first command stint came in 1991 when he worked 109 Squadron into F-16Ds at Ramat David. Headquarters beckoned and Shkedy led the Combat Branch of the Operations Department in 1993 before taking over the Department the next year. Following more college, the officer became Ramat David wing commander in 1998. He was back at AHQ in 2000 leading the Air Group and in 2002 the Headquarters itself. In April of that year came promotion to CO. In 2004 Shkedy worked to establish the Air Training Center with an "aggressor" training squadron. He commanded during the 2006 Second Lebanon War and then worked afterwards to correct the deficiencies revealed by the experience. Shkedy also ushered in the IASF role in targeted killing and fostered its growth to it becoming the common means of executing such attacks.

Lebanon in the face of persistent Hezbollah attacks. Israel began to suffer suicide bombings and other attacks originating from the Territories, with hundreds of civilian casualties. At the beginning of 2001, the government declared that a state of armed conflict existed with the PA. This soon reached the level where IDF tanks and helicopter gunships were being employed to strike Palestinian infrastructure in retaliation and as deterrence.

Counter-insurgency operations were soon consuming the lion's share of Zahal's attention and much of its resources. The IAF was initially marginalized in these operations until it reoriented to contribute and remain relevant while ensuring budget priority. In five years, it flew over 50,000 hours and prosecuted approximately 550 air attacks. The reorientation required an increasing role for UAVs (flying more than 30,000 hours) and attack helicopters, plus more direct collaboration with ground operation teams.[73] The service also had to adopt fast jets to urban combat. This last became necessary when TOW and Hellfire missiles were found inadequate in destroying targets such as buildings. Employing jets to drop heavier ordnance delivered a message by stepping up the level of violence.

On May 18, 2001, the IAF began bombing targets in the West Bank and Gaza Strip for the first time in over 30 years. Intending to induce the PA to restrain terrorist elements and placating Israeli public demands for action, destruction of the security apparatus worked against this goal and into the hands of extremists. The following day, the Arab League voted that its members sever ties with Israel. There was fear of a regional war sprouting from the confrontation.

The IAF assessed this as one of its most difficult conflicts. The new roles required agility in adjusting to results and enemy tactics shifts. One specific objective became reducing the sensor-to-shooter time to promptly hit identified but fleeting targets. The normal process was for UAV imagery to go through the IAF command center before being distributed to operational elements. In time, it was uplinked from a combined-arms tactical control center to helicopter cockpits. This permitted targets to be tracked to the point of optimal engagement and a final check for bystanders before missile launch or cannon fire. The use of armed UAVs cut the timeline even further.

Apart from hitting militia or terrorist sites, the IAF also undertook "targeted killings." These attacks on specific individuals grew from a long Israeli practice that had involved the Air Force only sporadically to that time given the higher potential for collateral casualties with aircraft-delivered ordnance. The hesitancy was relaxed given the growth of guerilla forces in Lebanon and the need to interrupt terrorist attacks from the territories lending greater urgency in eliminating extremist leadership. Air action was employed where use of ground personnel was judged too hazardous, but soon became the preferred method of attack. It demanded precision to reduce collateral damage and casualties, with fewer Israeli lives at risk, and was usually executed with helicopter-fired missiles. Ever bolder and questionably legal actions were planned and some executed.

Drone video began playing a role in all commando raids and airstrikes associated with the assassinations. They especially assisted aircrew in positively identifying targets before engaging. However, initial failure to encrypt the video link eventually allowed the enemy to view it and determine the objective of an operation. After one commando raid went badly wrong owing to this failure, the links were encrypted.[74] The drones aided the helicopter engagements as well with their laser designators assisting the aircrews in positively locating the target. The Apache crew then designated the target with their own laser and fired the Hellfire. A 200 Squadron team worked with 113 Squadron crews to develop the capability beginning in late 1990 and first employing it in 1991.[75] Its application during the 1990s in Lebanon likely exceed 100 strikes.[76] Eventually the crews were tracking and targeting individuals inside specific rooms of buildings, in moving vehicles, and even walking on the street.

In 2004, the IAF commander, Major-General Elyezer Shkedy, stated that extrajudicial assassinations were then the service's primary mission, although it made up the smallest proportion of the mission mix between 2000 and 2005.[77] Planning for such an operation was reduced to a day to exploit short-fuzed, even real-time intelligence.[78] Warning and retaliation strikes were the greatest, reaching a high of around 100 in 2001. More enemy personnel eliminated with fewer civilian casualties, and with terrorist strikes dropping, were the measures of success for the targeted killing efforts. The introduction of Hellfire 2 offered warhead options that helped in further reducing harm to bystanders or excessive property damage. The attack method was also valuable against mortar and rocket teams. A 1,000-lb (454-kg) GPS-guided concrete bomb and the 250-lb (113-kg) SDB were other options adopted for urban warfare.[79]

The role of UAVs continued to expand, and in 2001 the 200 Squadron was generating more missions and flight hours than any other IAF unit. That year it flew 557 operational sorties compared with 395 the prior year. In 2005, with much less than 100 vehicles (10-15 percent of the force's aircraft), they flew 18,000 of the service's 28,000 operational hours and was consuming 5-10 percent of the budget.[80] The Air Force began to contract-out some of the more routine surveillance operations. Introduction of the Hermes 450S assisted in keeping pace with greater capabilities. It was a rare operation in the Territories that was not assisted by a UAV. The close integration grew with some missions having a UAV observing ahead of the advancing ground team and a helicopter ready to respond immediately or even eliminate a growing threat before it struck Israeli personnel. Sometimes UAVs also scouted ahead of attack helicopters, alerting the crew to anti-aircraft threats.[81]

After more horrific suicide bomb attacks, the IDF launched a major incursion into West Bank areas on March 29, 2002, to destroy terrorist cells and resources. Attack helicopters and UAVs heavily supported the action. The IAF was tasked with a few bombing raids and precision strikes on buildings and vehicles, plus targeted killings. Large swathes of PA areas, including all major cities, were temporarily reoccupied. Infrastructure in Gaza was also destroyed, including the new airport and the government's two Mi-8 helicopters. The facility and its radar were bombed on December 4, 2001, and a month later Army bulldozers cut the runway at several points. It remained abandoned to date of writing. The 23-day action saw 26 Zahal soldiers killed and 127 wounded while about 150 Palestinians died.

The counter-insurgency reorientation of IAF operations stressed some aspects of the organizations in uncommon ways. In 2002, the service found it was running short of certain munitions and had to appeal to the USA for resupply. In 2003, it consumed its entire budgeted supply of fuel before the end of the year and had to cut back on all but essential training and operational flights. Some squadrons went more than a month without flying.

Israel's retaliatory policy of disproportionate force application continued to tarnish its image. In 2002, some members of the Air Force were expressing dismay at the course of operations with the spectacle of F-16s bombing buildings to kill individuals, but with family members also perishing. In 2003, 27 reservist aircrew sent a letter to IAF leadership refused to participate in missions in the Territories. This included a brigadier general who was the second-ranking ace. The IAF commander, Dani Haloutz, ordered all dismissed from the service.

In the Palestinian Authority's 2006 elections, the Hamas faction gained a plurality of seats in the parliament. As this organization promoted continued armed struggle with Israel and had been a principal instigator of Second Intifadah violence, Israel and most other nations stated they needed some indication the PA would remain non-violent despite the recognized terrorist organization being in ascendance. Hamas rejected this and economic assistance was subsequently suspended while Israel imposed sanctions. The Palestinian areas began to suffer and a PA unity government failed to satisfy the foreign powers. A struggle then ensued between Fatah and Hamas factions over control of the security apparatus. In 2007 there was armed conflict in Gaza, base of Hamas, ending with Fatah being expelled. From that time, the PA was split with neither faction recognizing the other's authority and only Fatah engaged by Israel and most other nations.

Israel would not negotiate with Hamas, and the Fatah-backed PA did not represent the entire Palestinian population. With no single party with which to negotiate, no further progress towards the two-state solution was made. The *status quo* served Israeli interests as any final decisions over borders, settlements, and Jerusalem was sure to set off a political and societal firestorm inside the country. Settlement and security activities continued, but there was a price to pay.

As in southern Lebanon, Zahal presence in the Gaza Strip had seemed only to fuel the growth of more radical elements like Hamas. Israel withdrew from the Strip completely in 2005, although it continued to exercise control of the airspace, coast, and border crossings. It appeared less costly to react from beyond the border. During the Second Intifadah, Hamas began firing homemade or foreign-built rockets across the border. The organization was principally funded and armed by Iran and so the projectiles increased in destructive power and range as weapons and fighters were smuggled in. Israel maintained a blockade to stem this flow of arms and related materials. The IN repeatedly intercepted vessels seeking to deliver contraband to Hamas and Hezbollah, some actions assisted by IASF surveillance and helicopter-delivered commandos. Introducing even greater civilian hardship, the blockade was seen by many as collective punishment.

Rockets remained the favorite Hamas means of retaliating against Israel or making a statement, along with small unit tactics. Attacks were met with artillery and some airstrikes. When the provocations reached intolerable volume, the Israelis retaliated with overwhelming power, especially shelling, bombing, precision missile attacks, and targeted killings, all supported by UAV and manned surveillance flights plus EW missions. The next decade saw cyclical escalations by Hamas answered by bursts of overwhelming IDF action that included hundreds of IASF sorties. The disproportionate retaliation included repeatedly destroying Gaza infrastructure (bridges, power station, and water distribution) to encourage the populace to urge Hamas restraint. Sonic boom intimidation was also employed. These strategies generally had the opposite effect. Paramilitary and Hamas administration buildings, smuggling tunnels, weapons factories and storage facilities, and rocket launch sites were common targets. Much effort was expended devising the best combination of systems to locate then quickly strike rocket and mortar teams before they moved. Joint command and intelligence centers were created to improve communications and facilitate rapid and optimal decision-making.[82] Israel invariably looked the bully in protecting its citizens by attempting to induce Hamas restraint through massive destruction with more deaths and resentment.

When Gaza heated up again in 2008 after a period of intense rocket fire, the Israelis reacted with the most concentrated and sustained air campaign ever executed in the Territories. It became the epitome of airpower use in urban warfare since the 139-square mile (360-km^2) Strip was mostly densely built-up and occupied by 1.5 million inhabitants. The operation began without warning with 64 aircraft hitting about 50 targets nearly simultaneously including Hamas administrative and paramilitary buildings.[83] This killed many targeted individuals owing to the tactical surprise. The next group of strikes to enter the dense combat zone was 24 sorties hitting rocket firing locations to forestall immediate Hamas reaction. Attention then turned to methodically working through a target list of weapons storage and manufacturing facilities, plus tunnels. The tunnels alone consumed 311 fixed-wing sorties or 17 percent and some employed deep-penetration munitions. The homes of Hamas leaders were destroyed, though residents were given warning to vacate. Apart from telephone calls, some buildings were first hit with a "roof-knocker" flash-bang charge on a light rocket to alert the residents to evacuate immediately before the missile or bomb arrived. The "knocker" may have been fired by UAVs. The IASF also dropped some 2.5 million leaflets.

The IASF then began the hunting-killing of rocket or mortar sites and teams in an around-the-clock operation. The sensor-to-shoot cycle had been reduced to 1-2 minutes thanks to a "Blue Force Tracker" system that identified the nearest resource and weapon to respond. A ground operation supported by attack helicopters then followed from day eight. The IASF fixed-wing aviation flew effective CAS with PGMs. In some cases, the ground actions supported air elements by clearing enemy from an area prior to a strike or concentrated forces for destruction. Coordination between the air and ground elements was much improved. Another difference from 2006 and Lebanon was that 81 percent of the ordnance were PGMs, sometimes delivered through cloud cover, with a reported 97 percent success rate. Casevac via UH-60 was another vital mission. Only nine Zahal personnel were killed, four from friendly fire.

Unlike 2006, the volume of rocket fire from the Gaza Strip dropped from a daily high of over 65 to fewer than 10 by the final days. Israel ended its operation after 23 days, having accomplished its objectives, and Hamas followed suit in declaring a ceasefire. The IASF flew 5,650 around-the-clock sorties of which 1,700 were fixed-wing strikes and 1,150 gunships. Of 5,400 weapons delivered on 3,430 targets, 1,120 or 21 percent were by chopper.

Despite the pounding suffered, Hamas continued to engage Israel. However, the flare-ups in 2012 and 2014 were similar as the IDF methodically worked through its current target list. A difference was that the Hamas principal offensive weapon (rockets) saw much reduced effectiveness with deployment of Iron Dome. Tunnels dug under the border were also detected and destroyed.

Hamas and Hezbollah also employed low-cost UAVs to harass Israel. When detected, these were usually quickly shot down. However, the frequency increased as a “war of drones” gradually developed. Flights from Lebanon in November 2004 and April 2005 succeeded in passing over Galilee for several minutes before returning safely across the border.[84] During the 2006 war, two Iranian Ababil UAVs were shot down by F-16s. Three incidents between 2012 and 2016 saw the UAVs fly well into Israeli airspace before being positively identified and brought down over remote areas. However, a Russian-made UAV penetrated from Syria in July 2016 and survived an F-16 and two Patriot intercept attempts before returning north. A Patriot did bring down an Iranian drone in the demilitarized zone abutting the Golan in September 2017. In February 2018, an Iranian-controlled drone, armed with an explosive device, was destroyed and Israel responded with strikes on Iranian targets, seeking to preclude the force becoming a permanent presence. The Iranians responded with rocket fire into the Golan that brought a heavier series of airstrikes during

Israel’s peace with Egypt had been frosty while that with Jordan was relatively warm if guarded. As an indication of this unusual relationship between former foes, Israel transferred 16 surplus AH-1F Cobra gunships in 2013 as part of a deal brokered by the USA. Two years later Jordan bought Skylark and Heron TP drones from Israel. One area of friction was revelations of Israeli covert activities on Jordanian soil.

16th Commander – Ido Nehushtan was called up in 1975 and selected for pilot training. After a stint as an A-4 pilot, he was posted to 107 Squadron in 1978 to fly F-4s. His time as a flight instructor came in 1979 and he also flew on the aerobatic team. This was followed by transition to F-16s and a posting to 253 Squadron where he eventually became a Deputy CO. In 1989, Nehushtan was picked to command 140 Squadron flying F-16s at Ramon AB and in 1991 the 105 at Hatzor AB. His first headquarters assignment had him leading the Armament Branch of the Weaponry Department in 1993 and the next year the Planning and Organization Department. The colonel returned to Hatzor in 1997 as the Wing CO. Back at the AHQ in 2000, Nehushtan led the Intelligence Group, the Air Group in 2002, and the Headquarters in 2004. He moved over to IDF headquarters in 2006 to lead the Planning Directorate. In May 2008 the general was named the newest IASF Commander and lead during the 2008 flare-up in Gaza.

Major-General Ido Nehushtan escorts the US Air Force Chief-of-Staff, General Mark Welsh, during a visit to Israel. Nehushtan commanded the IASF between 2008 and 2012. (Israeli Air Force)

The Boeing 707 fleet was vital to the IASF since first introduction in the 1970s. One mission was to carry the Prime Minister and other VIPs on state visits, particularly during the peace negotiations with Egypt. The aircraft had a special interior and was painted as an "Air Force One." The 707s had grown quite old by 2010 and the service occasionally sought airframes with fewer hours to replace the most aged examples. One such was actually a former Egypt Air aircraft that the Egyptian President had used during the same negotiations. Purchased from an American broker and modified by IAI, it entered IASF service in 2011 as 295, a boom tanker with 120 Squadron.

May 2018 that were met with SAMs. The IASF then destroyed the missile batteries. In January 2019, Iranian forces in Syria fired a medium-range ballistic missile aimed across Mt. Hermon into Israel. It was destroyed by anti-missile defenses.

Long Reach

Iran remained the greatest concern for Israel regarding weapons of mass destruction. The Islamic Republic's nuclear program was seen as an effort at developing atomic weapons. Its burgeoning missile program, with rockets of ever greater range, accuracy, and reliability, was worrying in their ability to deliver chemical and biological warheads, and possibly nuclear devices at some future date. The 1981 Israeli strike on Iraq's nuclear reactor was seen as inspiration for a like mission against Iran. However, their program was spread over many sites with some facilities deep underground to confound just such military planning.

The Air Force trained for the difficult mission of striking Iranian missile production and storage facilities, plus hunting deployed TELs. At approximately 1,000 miles (1,609 km) with many potential targets in the vast country, this would have been an exceptionally complex operation – equivalent to conducting a long-range war across unfriendly countries. The F-15Is and F-16Is were procured specifically with such missions in mind. The purchase of the stealthy F-35I would help in evading the S-300 anti-aircraft system the Iranians acquired from Russia. There was also a rumored Israeli Navy submarine-launched cruise missile capability that could contribute. An exercise in 2008 saw more than 100 F-15s and F-16s, supported by tankers and CSAR helicopters, fly some 900-mile (1,448-km) roundtrip over Greece and back in a clear rehearsal for such a mission.[85] This was followed in 2009 by a large force flying to Gibraltar and back, or a 2,350-mile (3,782-km) round-trip. That year the IASF also began employing "hot refueling" to top-off jets with engines running just before takeoff for absolute maximum fuel load.[86]

The 2015 agreement between permanent members of the UN Security Council and Iran ostensibly forestalled the nuclear potential while deployment of the Arrow ABM system came close to neutralizing Iran's missile threat. Time was bought, but the IASF continued preparing for an offensive solution. The 2015 agreement was distained by many "hawks" in Israel and a new administration in the USA withdrew in 2018. However, nothing changed materially or immediately.

A mission well short of any planned Iranian strike, though demonstrating the requisite capabilities, was flown on the night of September 5-6, 2007. The IASF bombed a nuclear reactor Syria was completing in the northeast of the country with the assistance of North Korea and funding from Iran. Commandos and vehicles lifted by two CH-53s at night preceded the mission by a month, collecting samples near the site to confirm the presence of nuclear materials. The strike was flown by four F-15Is from 69 Squadron and four F-16Is, two each from 119 and 253 carrying 2,000-lb (907-kg) JDAMs. There were likely electronic intelligence (ELINT)

The strike on the Syrian nuclear reactor in 2007 included F-16Is dropping 2,000-lb JDAM bombs. This is an image of one participant preparing to depart on the night mission, the 253 Squadron F-16I with the Israeli 600-gallon drop tanks and carrying wingtip AIM-120 missiles. (Yoav Efrati Collection) aircraft in support that deceived the Syrian air defense network that failed to react. Cyber-attack on the network may also have played a role via capabilities the IDF had been growing. As always, CSAR helos were on standby to retrieve downed aircrew. The formation appears to have flown up the Mediterranean coast then along the Syrian/Turkey border at very low altitude, and home the same way. F-15 external fuel tanks were found in Turkey. The attack was not remarked on in Washington or Jerusalem for months after, and Syria did not retaliate. It was 2017 before Israel openly admitted to executing the raid.[87]

Like the 2007 strike in Syria, later IASF power-projection operations in the new century were not trumpeted. Efforts to prevent Hamas and Hezbollah acquiring weapons beyond tolerated capabilities prompted some long-range bombing missions. The IASF allegedly struck a convoy of trucks in Sudan in January 2009 at approximately 1,000 miles (1,609 km) range. The vehicles were said to have been smuggling Iranian rockets to Gaza through Egypt. Both Hermes UAVs (presumably on one-way missions) and fighter-bombers guided by UAV updates were attributed as the attackers, though more inventive means have also been suggested. Another attempted delivery in February via sea met with the same fate when explosions rocked a docked Iranian ship. This may have involved naval commandos. Another convoy approaching the Sudanese border with Egypt was hit in June 2009. A vehicle, allegedly carrying a top Hamas go-between with the Iranians, exploded near Port Sudan in April 2011. Then, there were claims that the IASF attacked a truck convoy in Sudan in late 2011 and four F-15s hit a munitions factory in Khartoum in October 2012. In addition, in July 2014, an ammunition warehouse in a military training camp north of the capital exploded and the IASF was again blamed. Something similar occurred in May 2015 when an arms cache blew up. To date of writing, the Israeli government had only hinted at responsibility for the Sudan events.

The IASF is also rumored to have struck weapons destined for Gaza that reached Sinai and likely UAV targeted killings in the peninsula. These operations were apparently conducted with the tacit acquiescence of Cairo given meager Egyptian ability to control what was becoming a lawless region.

Hindsight/Foresight

As its 75th anniversary approached, the Israeli Air and Space Force stood ready to meet threats near and far. Yet, its capabilities required constant attention. As the threats to Israeli security morphed and money diminished, the IASF leadership was constantly challenged. They had to focus on operational capability and not staff work, maintain the high standards of the past, and ensure sufficient dedicated personnel of high caliber willing to serve beyond the minimum conscription or training commitment. The society as a whole had less of the "we're all in this together" motivation of past generations, with more young people resisted service given lucrative opportunities or sought non-combat duties. With many activities contracted out, there were fewer jobs for a surplus of draftees. Reserve duty also became an exception rather than the rule. Bonuses and other incentives were devised to bolster the less attractive IDF retirement benefits. Made up mostly of regulars and civilian staff as it approached its 75th year, the service had to guard against excessive centralization and becoming "top-heavy" with senior officers, consultants, and esoteric airpower theories.

Only a few of the adversaries of the past remained, though diminished. Dealing with non-state actors had become the IDF's principal focus. The cycle of regional violence seemed unending as a settlement with the Palestinians satisfying all armed factions, and acceptance of Israel's existence by all Muslim entities, remain beyond sight. By 2020, the IDF had a list of 10,000 targets to be prosecuted in the continuing effort at knocking back the nearest forces for a time and reduce the immediate threat to its citizens, while the cycle repeated.

Major-General Amir Eshel anoints new graduates of an Air Defense Command training program. The general led the Air Force from 2012 to 2017. (Israeli Air Force)

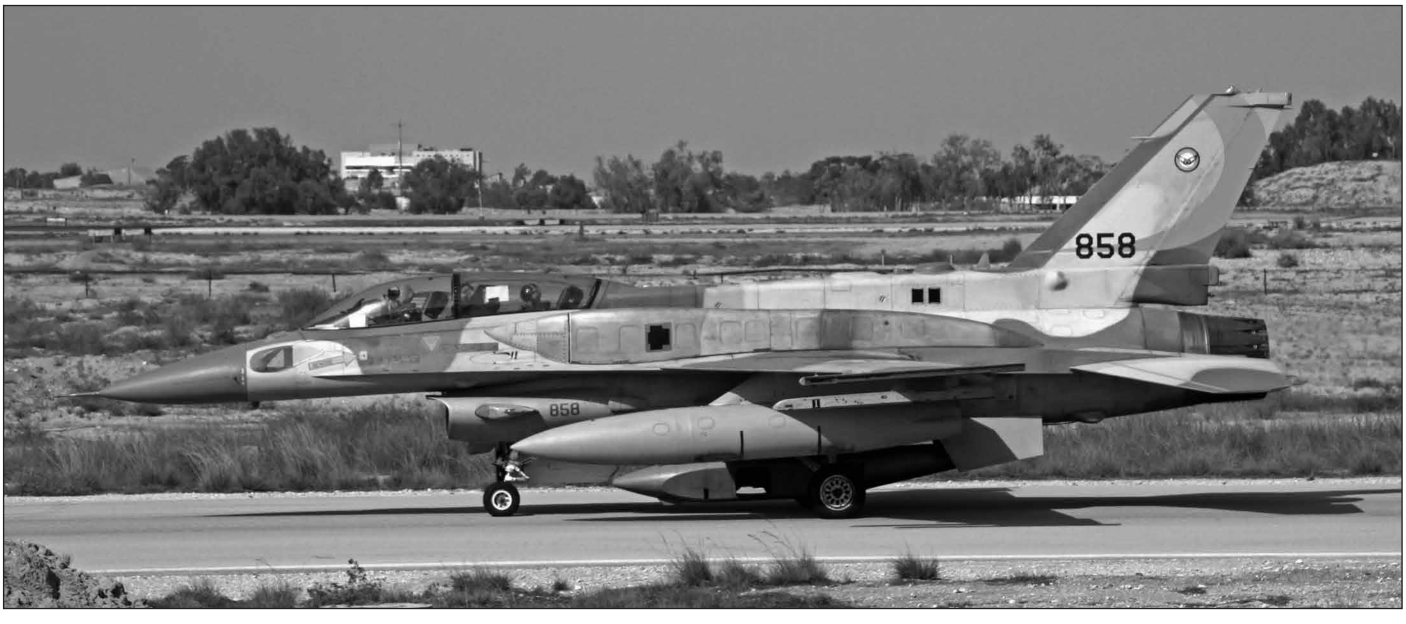
17th Commander – Amir Eshel entered pilot training in 1977 and upon graduation flew A-4s with 149 Squadron at Etzion AB and then Ramon. After a time as a flight instructor, he transitioned to F-16s at Ramat David AB. His command stint came in 1993 to 1995, with 201 with Phantoms out of Tel Nof. At headquarters, he led the Operations Division in 1997 to 1999. Back in the field, Eshel commanded the Ramon and Tel Nof wings. Returning to AHQ in 2004, he headed Air Group and then the Headquarters (Chief-of-Staff) in 2006. At the IDF headquarters, Eshel led the Planning Directorate in 2008. May 2012 saw the general rise to the top post as Air Force CO. One of his noted achievements was closer integration of air and ground operations.

However, some things did markedly change from decades past. The narrative that Israel was continuously fighting for its survival, facing imminent destruction from encircling hostile nations, had been invalid since the 1980s. Furthermore, the newer generations worldwide saw Israel as a "bully," suppressing Palestinian rights via an IDF employing excessive force and unwilling to negotiate as it appropriated additional West Bank land for settlements. Regarding the Air Force, the long-stated claim that the IAF was the most experienced air force in the world was no longer true by the last decade of the 20th century. NATO forces, particularly the United States, were very busy since the dissolution of the Soviet Union dealing with instability in Eastern Europe and the Middle East, and the growing threat of international terrorism in failing states. Experience must not be confused with legacy spun into legend. Experience extends to the limits of individual careers and so is effectively 20 to 30 years before fading. Likewise, tactics derived from one period of combat may be unsuited to another. As with any military force, billions of dollars of equipment must be coupled with suitable training and sound leadership of dedicated personnel for a truly reliable and effective combat capability. Since 1982, the IAF was primarily devoted to hitting nearby terrorist targets or other irregular threats in an environment of undisputed air supremacy and manageable air defenses. This did not substantially stress the organization nor require the best capabilities of its many leading-edge weapon systems – a measure of suitable preparedness. Its few missions beyond the Territories, Lebanon, and Syria, were likewise small affairs compared to those executed by other countries. The greatest IASF experience carried forward generation-to-generation was getting by with a modest quantity of resources augmented with indigenous equipment and operated with boldness by thoroughly training professionals.

The Air Force's success in combat can be attributed to many factors. The region's climate, close borders, and the nature of the wars fought were well suited to the exploitation of airpower. The IAF was better equipped and trained than its adversaries in all battles after the summer of 1948. The high quality of its personnel could be credited to the feeling of national and racial solidarity, a clear understanding of their role in national defense, high motivation, and confidence in their democratic intuitions. The well-educated, professional, and relatively youthful officer corps in a comparatively lean command structure contributed much to sound leadership. The high standards of officer selection, the routine of self-criticism, and constant competition among personnel, plus realistic and intensive training, had long been important to the IAF's combat effectiveness. Yet, all these factors required constant attention.

Like many other combat teams, the IAF's training was guided by the motto "Hard in training – easy in combat." Aided by very good flying weather, according to the Israelis (and at times clearly disingenuous) the pilots had typically logged more time than their contemporaries in Western air forces, and approximately twice that of their adversaries. For fighter pilots during the late 1960s, this had amounted to 24 hours per month versus 12 to 16 hours in most air forces. It is known that hours were subsequently reduced and simulators substituted. Pilot-to-aircraft ratio was also reduced to less than half other Western air arms.[88] Training realism was always sought. By 2005, the Emergency Posting aircrew flew once a week and reservists once every 10 days. Simulators were, at least initially, a supplement to these rather than a replacement.

Israeli pilot proficiency, tactical adaptability, and overall state of readiness always appeared far ahead of their opponents. A great deal of authority for manning, training, and tactics development was delegated down to the wing and squadron level leadership to encourage creative thinking and experimentation. What was learned was then transferred to other units as personnel moved between assignments, as is common in all militaries. Mission execution continued to be closely guided by central control supervised by the force's most senior officers in headquarters, the IASF commander usually sitting near the controllers on the radio during operations. Commanders were said to be less burdened with directives and reporting requirements as in Western air forces. This helped



This F-16I of 107 Squadron carries a Condor 2 camera pod on its centerline that is based on the aircraft's 300-gallon tank. Developed locally by Israeli companies Elbit and Elop, it is among several systems that sustain manned aircraft photo reconnaissance. (Ofer Zidon Collection)

18th Commander – Amikam Norkin went to the flight academy upon being drafted in 1985. His first assignment was to 133 Squadron as the youngest F-15 fighter pilot in the world. After various staff postings, his first squadron command was also 133 where he served until 2002. Norkin then led the team to reestablish 253 Squadron to operate the new F-16Is in 2004. The colonel headed IASF Operations during the Second Lebanon War. As a brigadier general, he took command of Tel Nof AB in 2009. Somewhere along the way Norkin also found time to earn a Masters of Political Science. Head of Air Division followed in 2012 to 2014, then Chief of Air Staff. His next promotion brought a post in IDF Planning Directorate. He was appointed IASF commander in August 2017.

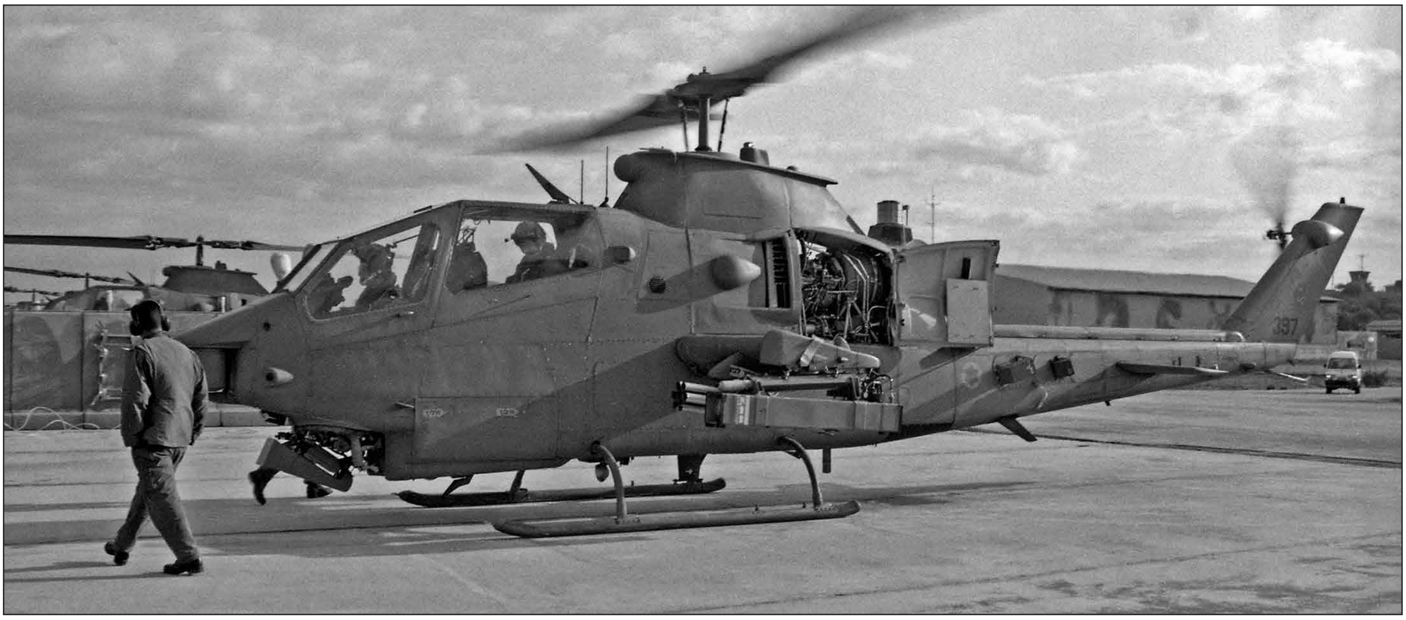
Amikam Norkin was the first officer to be promoted to IASF commander who entered the service after the era of the “big mid-east wars.” Here Norkin awards wings to new graduates of the pilot course at the Israeli Air Force Academy (all first lieutenants) in 2018. This includes a young woman, among many to be passed out of the course in the 23 years since the service began training females for flying roles after decades of refusal. (Israeli Air Force)

achieve readiness, flexibility, and adaptability. The force was always relatively small, with close coordination simplified by the short distances between facilities.

The Air Force also benefitted from having to deal with a known group of adversaries possessing a limited collection of weapons within a fairly small theater, requiring a narrower set of responding missions, tactics, and equipment than larger air arms with broader theaters. In equipment, personnel, and tactics the Israelis were consistently superior. In the first quarter century, the enemy kept coming despite their defeats, and this was reflected in the greatly lopsided loss ratios in the air. Particularly in Lebanon during 1982, the leadership and command culture that led the Syrians to send its air force out to almost certain destruction is difficult to fathom. Such opportunities to score numerous “kills” and make “ace” status had been seen in other conflicts like the German air war over the Soviet Union in 1941-1944, American success against the Japanese in the latter half of the Second World War, and American combat over North Korea in 1950-1953. Even into the 2000s, the Israeli air power circumstances of marked superiority and combat with little effective opposition was reflected only by American and Western coalition or NATO air operations in many of the world’s conflict zones. Yet, most militaries remained interested in how the IDF, and especially the IASF, responded to its challenges.

One last element of the IAF’s success was that their enemies had generally failed to exemplify Israel’s advantageous characteristics to the same extent. The Arab states usually did not adequately coordinate their military operations to seize the initiative or eliminate the underlying mistrust and deception that characterized much of their relationships. The Egyptian Air Force, for example, had a smaller pool of potential pilots to draw from as a proportion of the population than Israel and never succeeded in having even one pilot per aircraft during the height of its struggle with Israel. The equipment of these forces was also inferior, their patron not willing to provide the same quality of resources as Israel’s suppliers. Even after many surrounding countries began to buy Western armaments, the IAF/IASF kept its edge with unique Israeli gear or features the Americans released only to its closest allies.

After 75 years, the Israeli Air and Space Force was as modern, well trained, capable, and possessing high readiness, as any leading air force in the world for the threats it was prepared to



The last incarnation of the AH-1 in the IASF, then used as an armed scout, integrated the indigenous Spike missile, seen here as only two rounds in box launch containers beside rocket launchers. The nose gun was displaced by a sensor package associated with the missile. Aircraft 397 has the 161 Squadron badge adorning the tail. (Ra'anan Weiss Collection)

meet. It was professional, reflecting much the same structure, guiding principles, and standards as its contemporaries. In many ways, it was very similar to these other air arms and so had lost some of its special character from earlier decades. The remaining unusual aspect was finding all of these positive attributes in so small a country, especially its moderate power-projection capacity, and with governments willingly considering its employment. Fundamentally, it did not do anything the United States air arms had not done more routinely. Given its many important missions and its ability to respond quickly, there continued to be great emphasis on the Israeli Air Force in budget allocations, receiving approximately 50 percent. Yet, the service continued to shrink while always seeking to remain lean and flexible.

Israel's struggle to remain secure while taking the next steps towards making peace lasting and real on a human level had shaped up to be as challenging as the battlefield struggles of the past. The world community had become less willing to look the other way when "little" Israel took bold but unpleasant action in the name of security. These realities continually challenged the IASF's ability to apply focused applications of violence or even non-kinetic means. The situation further substantiates the old adage that feats of arms may bring victory, but they do not necessarily bring peace. As Israel annually remembered her roughly 13,000 war dead, such concerns were never far from the minds of its citizens. Reliance upon and regard for its Air Force remained high.

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